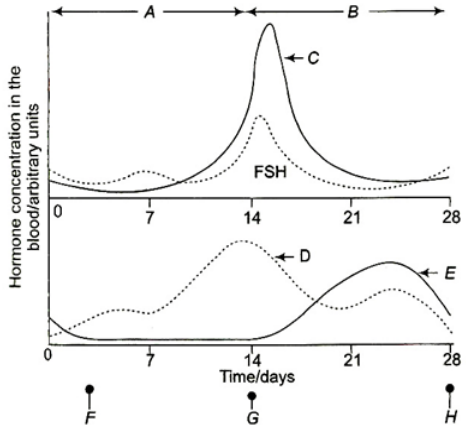
NEET BIOLOGY

HUMAN REPRODUCTION

1. Milk secreted from the cells of alveoli of mammary lobes reaches to the nipple by Lactiferous duct (L), Mammary duct (M), mammary Tubule (T) and mammary Ampulla (A) in following order
   a) T A M L b) T M A L c) M T A L d) A T M L
2. The diagram shows some of the changes in blood hormone concentration which occur during the menstrual cycle. Match A,B,C,D,E,F,G and H of graph with the hormones and events given below



Hormones and Events

I. Oestrogen
II. Ovulation
III. Repair of endometrium
IV. Luteinizing hormone
V. Menstruation
VI. Luteal phase
VII. Progesterone
VIII. Ovarian phase

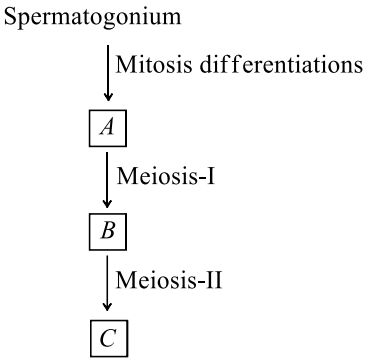
   a) I-H, II-G, III-F, IV-E, V-D, VL-C, VII-B, VIII-A b) I-D, II-E, III-F, IV-G, V-H, VI-A, VII-C, VIII-C
   c) I-D, II-G, III-F, IV-C, V-H, VI-B, VII-E, VIII-A d) I-A, II-C, III-E, IV-G, V-H, VI-F, VII-D, VIII-B
3. In frog, gastrulation process involves
   a) Epiboly b) Emboly c) Invagination d) All of theses
4. Name the most important hormone which causes the uterine contraction strongly
   a) Oxytocin b) Inhibin c) Protection d) Progesterone
5. Correct sequence of hormone from beginning of menstrual cycle to the end is
   a) FSH, progesterone, LH b) Oestrogen, FSH and progesterone
   c) FSH, oestrogen, progesterone d) Oestrogen, progesterone, FSH
6. Which of the following is incorrectly matched?
   a) Rabbit – Microlecithal, isolecithal b) Frog – Mesolecithal, telolecithal
   c) Human – Mesolecithal, centrolecithal d) Birds – Macrolecithal, telolecithal
7. Capacitation takes place in
   a) 12 hrs b) 10 hrs c) 8 hrs d) 6 hrs
8. Grey crescent is the area
   a) At the point of entry of sperm into ovum
   b) Just opposite to the site of entry of sperm into ovum
   c) At the animal pole

d) At the vegetal pole

9. Both corpus luteum and macula lutea are
   a) Found in human ovaries
   b) A source of hormones
   c) Characterized by a yellow colour
   d) Contributory in maintaining pregnancy
10. A cross section at the midpoint of the middle piece of a human sperm will show
   a) Centriole, mitochondria and 9+2 arrangement of microtubules
   b) Centriole and mitochondria
   c) mitochondria and 9+2 arrangement of microtubules
   d) 9+2 arrangement of microtubules only
11. Fertilization is
   a) Fusion of male and female gametes
   b) Fission of male and female gametes
   c) Formation of gametes
   d) Formation of embryo
12. Cleavage is
   a) Meiosis of zygote into blastomeres
   b) Mitosis of zygote into blastomeres
   c) Reductional division of zygote
   d) Reductional division of embryo
13. How many phases (stages) are there in menstrual cycle?
   a) 2 b) 6 c) 4 d) 5
14. Rapid secretion of LH in ovulation causes
   a) Repturing of Graafian follicle
   b) Releasing of ove
   c) Ovulation
   d) All of the above
15. The phase of menstrual cycle in humans that lasts for 7-8 days, is
   a) Follicular phase b) Ovulatory phase c) Luteal phase d) Menstruation
16. Correct sequence in development is
   a) Fertilization → zygote → cleavage → morula → blastula → gastrula
   b) Fertilization → zygotes → blastula → cleavage → gastrula
   c) Fertilization → cleavage → morula → zygote → blastula
   d) cleavage → zygote → morula → zygote → blastula
17. Fertilization of ovum takes place in rabbit, man and other placental mammals in
   a) Ovary b) Fallopian tube c) Cervix d) Uterus
18. Placenta acts as an
   a) Endocrine gland b) Exocrine gland c) Apocrine gland d) Merocrine gland
19. Extraembryonic membranes, chorion and amnion are formed by
   a) Inner mass cells b) Trophoblast c) Both (a) and (b) d) None of these
20. Extraembryonic membranes are also called
   a) Foetal membranes
   b) Embryonic membranes
   c) Outer membranes
   d) Inner membranes
21. Capacitation of sperm occurs in
   a) Female genital tract b) Vas deferens c) Vas efferens d) Vagina
22. Temporary storage of sperms takes place in
   a) Vasa deferentia b) Vasa efferentia c) Epididymis d) Rete testis
23. The immediate cause of induction of ovulation in female is the large plasma surge of
   a) Progesterone b) Oestriadiol c) LH d) FSH
24. Which hormone level increases in the luteal phase?
   a) LH b) Progesterone c) Testosterone d) FSH
25. Process of maturation and development of sperm is called
   a) Oogenesis b) Spermatogenesis c) Spermiogenesis d) None of these
26. The collective term used for acrosomal chemicals is
   a) Sperm living b) Sperm lysins c) Pectinase d) Cellulase
27. Which of the following structures are derivatives of the endoderm?
   a) Alimentary canal and respiratory structure
   b) Muscles and blood

c) Excretory and reproductive structure
d) Skin and nerve cord

28. Graafian follicle contains
    a) Oogaonial cells
    b) Corpus luteum
    c) Theca externa and theca interna
    d) Corpus albicans
29. If mammalian ovum fails to get fertilized, which one of the following is unlikely?
    a) Corpus luteum will disintegrate
    b) Oestrogen secretion further decreases
    c) Primary follicle starts developing
    d) Progesterone secretion rapidly declines
30. Identify *A*, *B* and *C* in the following figure



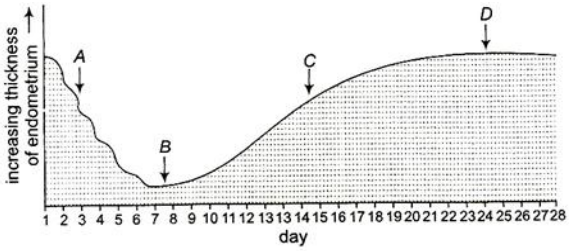
    a) A-Secondary spermatocytes, B-Primary spermatocytes, C-Spermatids
    b) A-Spermatids, B-Primary spermatocytes, C-Spermatocytes
    c) A-Spermatids, B-Secondary spermatocytes, C-Primary spermatocytes
    d) A-Primary spermatocytes, B-Secondary spermatocytes, C-Spermatids
31. Which is regarded as urinary bladder of embryo?
    a) Amnion
    b) Allantois
    c) Chorion
    d) Yolk sac
32. Each ovary is bout 2-4 cm in length connected to the …A… wall by …B… Each ovary is covered by a thin epithelium which encloses the ovarian stroma. Stroma is divided into two zones …C… and …D…
    Fill the suitable choices for A to D
    a) A-inner medulla, B-peripheral cortex, C-ligament, D-pelvic wall
    b) A- pelvic, B- ligament, C- peripheral cortex, D- inner medulla
    c) A- pelvic, B-peripheral cortex, C-ligament, D- inner medulla
    d) A-inner medulla, B-peripheral cortex, C-ligament, D-pelvic wall
33. The female structures that corresponds (homologous) to the scrotum of the male are
    a) Labia Minora
    b) Labia majora
    c) Clitoris
    d) Urethral folds
34. Which part of ovary in mammals acts as an endocrine gland after ovulation
    a) Graafian follicle
    b) Stroma
    c) Germinal epithelium
    d) Vitelline membrane
35. According to which theory, ageing is due to accumulation of harmful protein?
    a) Error catastrophe
    b) Free radicle
    c) Cross linking
    d) Somatic mutation
36. Vasa efferentia are the ductules leading from
    a) Testicular lobules to rete testis
    b) rete testes to vas deferens
    c) Vas deferens to epididymis
    d) Epididymis to urethra
37. Hormone injected by doctors to induce delivery is
    a) Inhibin
    b) Oxytocin
    c) Oestrogen
    d) Prolactin
38. Which one of the following is the most likely reason of not occurring regular menstruation cycle in females?
    a) Fertilization of the ovum
    b) Maintenance of the hypertrophical endometrial lining
    c) Maintenance of high concentration of sex-hormones in the blood stream
    d) Retention of well-developed cropus luteum
39. Corpus luteum release
    a) Oestrogen
    b) Progesterone
    c) Both (a) and (b)
    d) Androgen
40. In the human female, menstruation can be deferred by the administration of

a) LH only
b) Combination of FSH and LH
c) Combination of oestrogen and progesterone
d) FSH only

41. Which of the following embryonic-membrane structure is excretory in function?
a) Amnion
b) Allantois
c) Yolk sac
d) Vitelline chorion

42. I. Sperm cells the immediately when they are released from the body and are placed in a petri plate.
II. Semen contains chemicals that causes females smooth muscles to contract
a) Statement I is true, but II is false
b) Both statements I and II are false
c) Statement I is false, but II is true
d) Both statements are true

43. The diagram shows the changes that take place in the endometrium during a normal menstruation



a) A-ovulation; B-menstruation
b) A-ovulation; C-menstruation
c) C-ovulation; A-menstruation
d) B-ovulation; D-menstruation

44. Sertoli's cells are found in
a) Ovaries and secrete progesterone
b) Adrenal cortex and secrete adrenaline
c) Seminiferous tubules and provide nutrition to germ cells
d) Pancreas and secrete cholecystokinin

45. Ovum receives the sperm in the region of
a) Animal pole
b) Vegetal pole
c) Equator
d) Pigmented area

46. hCS (Human Chorionic Somatomammotrophin) previously called
a) Human placental lactogen (hPL)
b) Chorionic thyrotrophin
c) Chorionic corticotropin
d) Relaxin

47. Women who consumed the drug thalidomide for relief from vomiting during early months of pregnancy gave birth to children with
a) No spleen
b) Hare-lip
c) Extra fingers and toes
d) Under developed limbs

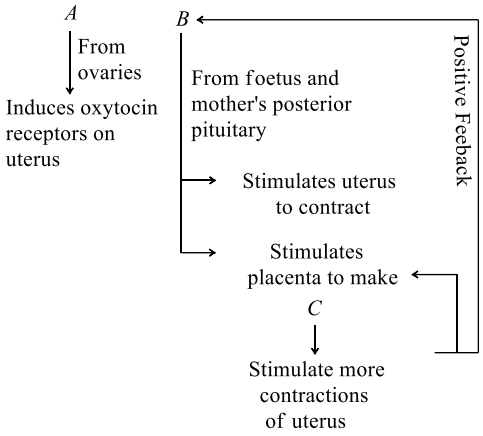
48. Which of the following is not correct for gasrtulation?
a) Archenteron is formed
b) All germinal layers are formed
c) Morphogenetic movements
d) Some blastomeres and blastocoel degenerate

49. Release of semen by penis into vagina during copulation (coitus) is called
a) Insemination
b) Fertilisaton
c) Zygote
d) Gametogenesis

50. Temperature of human testis is
a) 2-2.5 below body temperature
b) 38°C
c) 33°C
d) 2.25 above body temperature

51. Follicular phase is also called
a) Secretory phase
b) Luteal phase
c) Proliferative phase
d) Menstrual phase

52. Name A, B, C chormones in the given figure



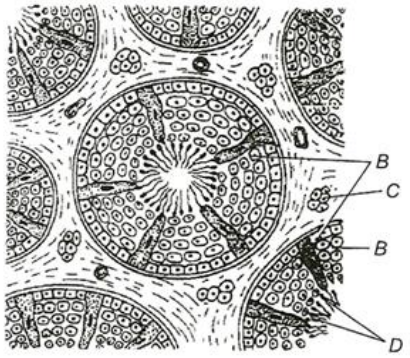
a) A-Prostaglandin, B-Oxytocin, C-Oestrogen
b) A- Oestrogen, B-Oxytocin, C- Prostaglandin
c) A- Oestrogen, B- Prostaglandin, C- Oxytocin
d) A-Prostaglandin, B- Oestrogen, C- Oxytocin

53. The vasa efferentia leave the testis and opens into the …A…, located along the …B… surface. Here A and B refers to
a) A-rete testis; B-epididymis
b) A-epididymis; B- rete testis
c) A-epididymis; B-posterior
d) A-epididymis; B-anterior

54. Where do sperms get matured?
a) In seminal vesicle
b) Seminiferous tubules
c) In epididymis
d) Vasa efferentia

55. Sertoli cells are also called
a) Subtentacular cells b) Sperm cells c) Interstitial cells d) Leyding cells

56. Given below the diagram refers to the TS of testis showing sectional view of a few seminiferous tubules



a) A-Sertoli cells, B-Secondary spermatocyte, C-Interstitial cells, D-Sperms
b) A-Interstitial cells, B-Spermatogonia, C-Sertoli cells, D-Sperms
c) A-Sertoli cells, B-Spermatozoa, C-Interstitial cells, D-Sperms
d) A-Sertoli cells, B- Spermatogonia, C-Interstitial cells, D-Sperms

57. Lobules contain cluster of cells called …A… which secretes …B… . Alveoli opens into mammary tubules, which joins to form ….C…
A, B and C here, refers to
a) A-milk, B-alveoli, C-mammary duct
b) A- mammary duct, B-alveoli, C- milk
c) A- mammary duct, B- milk, C- alveoli
d) A- alveoli, B- milk, C-mammary duct

58. Female pronucleus is
a) Cytoplasm of ovum
b) Nucleus of ovum
c) Nucleus of quaternary oocyte
d) Both (b) and (c)

59. Correct statement with reference to a test tube bay is

a) The fertilized egg is placed in the womb of the mother where the gastrula period is completed
b) Unfertilized egg is placed in the womb and allowed to grow parthenogenetically
c) A prematurely born baby is reared in an incubator
d) Fertilized egg is taken out and grown in a large test tube

60. Ovum is
a) Secondary oocyte b) Primary oocyte c) Tertiary oocyte d) None of these

61. Sperm lysins contains
a) Hyaluronidase
b) Corona penetrating enzyme
c) Acrosin
d) All of the above

62. The seminal plasma along with the sperm is called
a) Spermatid b) Spermatozoa c) Semen d) All of these

63. The superior portion of the uterus is
a) Body b) Cervix c) Fundus d) Infundibulum

64. hCG (Human Chorionic Gonado trophin) and hPL (Human Placental Lactogen) are released
a) Before pregnancy
b) During pregnancy
c) At parturition
d) During lactating stage

65. Process of delivery of the foetus is called
a) Parturition b) Implantation c) Fertilization d) Lactation

66. At which stage of the cell cycle, secondary oocyte gets arrested before pregnancy?
a) Anaphase-I b) Prophase-II c) Metaphase-III d) Telohase-I

67. Lactation produces milk
a) Towards the end of pregnancy b) Towards the beginning pregnancy
c) Towards the beginning of puberty d) Through out the life cycle

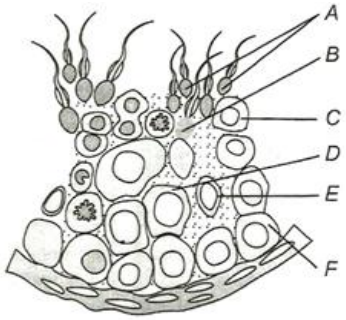
68. Which one of the following statements with regard to embryonic development in humans is correct?
a) Cleavage divisions bring about considerable increase in the mass of protoplasm
b) In the second cleavage division, one of the two blastomeres usually divides a little sooner than the second
c) With more cleavage divisions, the resultant blastomeres become larger and larger
d) Cleavage division results in a hollow ball of cells called morula

69. Which of the following hormones is not a secretory product of human placenta?
a) Human chorionic gonadotropin b) Prolactin
c) Oestrogen d) Progesterone

70. Hyaluroniadase acts on ground tissue of …A… cells. Corona penetrating enzyme dissolves the …B… and zonalysin dissolve the ….C… . Here A, B and C refers to
a) A-follicle, B-corona radiata, C-zona pellucida
b) A- zona pellucida, B-corona radiata, C- follicle
c) A-follicle, B- zona pellucida, C-zona radiata
d) A- corona radiata, B- zona pellucida, C- follicle

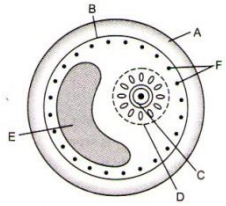
71. The corpus luteum secretes progesterone which negatively feeds back and inhibits the release of
a) ABP and ICSH b) LH and ICSH c) LH and FSH d) FSH and TSH

72. Find out spermatid and Sertoli cell in given diagram



a) D to E b) E to F c) A to C d) B to E

73. During embryonic development, endoskeleton and muscle develop from which germinal layer?
a) Ectoderm b) Endoderm c) Mesoderm d) Blastopore
74. Eggs which have yolk in the centre surrounded by cytoplasm are called
a) Centrolecithal b) Homolecithal c) Microlecithal d) Alecithal
75. Whether a child died after normal birth or died before birth can be confirmed by measuring
a) Tidal volume of air b) Residual volume of air
c) The weight of the child d) The dead space air
76. The movement of spermatozoa, from the epididymal duct and seminal fluid into the ejaculatory duct to urethra is under the control of
a) Parasympathetic and sympathetic nerve
b) Parasympathetic nerve only
c) Sometimes sympathetic and sometimes parasympathetic nerves
d) Sympathetic nerve only
77. Sertoli's cell are regulated by the pituitary hormone known as
a) FSH b) GH c) Prolactin d) LH
78. Inflammation of the seminiferous tubules could interfere with the ability to
a) Make semen alkaline b) Secrete testosterone
c) Produce spermatozoa d) Eliminate urine from the bladder
79. The gestation period of elephant is about
a) 11 months b) 15 months c) 22 months d) 32 months
80. Which one of the following systems is not mesodermal in origin?
a) Circulatory system b) Muscular system c) Nervous system d) None of the above
81. In the diagram of section of Graafian follicle, different parts are indicated by alphabets; choose the answer in which these alphabets have been correctly matched with the parts they indicate.



a) A –Theca externa, B-Theca interna, C-Ovum
D-Cumulus oophorus, E-Antrum, F-Membrana granulosa
b) A - Membrana granulosa, B- Theca externa, C- Ovum
D-Cumulus oophorus, E-Antrum,

F-Theca interna,

c) A - Membrana granulosa, B-Theca interna,

C-Ovum,D-Cumulus oophorus,
E-Antrum,

F-Theca externa

d) A –Theca externa, B-Theca interna, C-Ovum
D-Membrana granulosa, E-Antrum,

F-Cumulus oophorus,

82. Which part of a sperm enters into an ovum during fertilization?
a) Head b) Tail c) Whole of it d) Middle piece

83. Graafian follicle after releasing ovum is called
a) Corpus luteum b) Polar body c) Nuclear body d) Ootid

84. External genitalia of male are called
a) Testis b) Penis c) Scrotum d) All of these

85. Enzyme present in sperm acrosome to dissolve egg membrane is
a) Sperm lysine b) Ovolysin c) Spermatogenolysin d) Spermatocynin

86. The second maturation division of the mammalian ovum occurs
a) Shortly after ovulation before the ovum makes entry into the fallopian tube
b) Until after the ovum has been penetrated by a sperm
c) Until the nucleus of the sperm has fused with that of the ovum
d) In the Graafian follicle following the first maturation division

87. Luteal phase is also called
a) Secretory phase b) Bleeding phase
c) Menses phase d) Ovulatory phase

88. Spermatogenesis is influenced by
a) Progesterone b) FSH c) STH d) LTH

89. How many mature, functional follicles are produced by a female in a lifetime?
a) About 1 million b) 400 c) 4000 d) 350000

90. Androgen Binding Protein (ABP) and inhibin are secreted by
a) Interstitial cells b) Leydig cells
c) Sertoli cells d) Germinal epithelium

91. Neubenkern is a part to
a) Human ovum b) Foetus c) Human sperm d) Graafian follicle

92. Enlarged end of penis (called the glans penis) is covered by the skin called
a) Foreskin b) Prepuce c) Both (a) and (b) d) None of the above

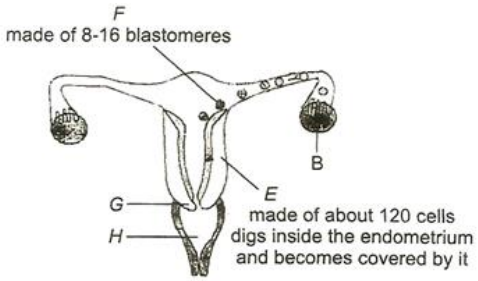
93. Interstitial cells secrets
a) Androgens b) Oestrogen c) FSH d) Inhibin

94. Most mammals have their testis sac called scrotal sac which is for
a) Protection b) Ova formation
c) Sperm formation d) Temperature regulation

95. The main function of trophoectoderm in mammalian embryo is
a) Protection of the developing cells b) Drawing food for the developing cell
c) Formation of future ectoderm d) Formation of placenta

96. The correct sequence of male reproductive structures of rabbit through which sperms pass out is
I. Rete testes
II. Vasa efferentia
III. Epididymis
IV. Vasa deferentia
a) I, II, III, IV b) II, III, IV, I c) II, III, I, IV d) I, III, II, IV

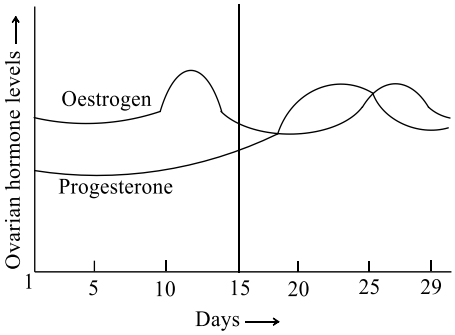
97. Label the following diagram which illustrates the fertilization followed by cleavage and the early stages of embryonic development. Identify B, E, F, G and H



a) B-Ovary, E-Morula, F-Blastocyst, G-Cervix, H-Vagina
b) B-Ovary, E- Blastocyst, F- Morula, G-Cervix, H-Vagina
c) B-Ovary, E- Blastocyst, F- Morula, G- Vagina, H- Cervix
d) B-Ovary, E- Blastocyst, F-Gastrula, G- Vagina, H- Cervix

98. Binary fission is a mode of
a) Micropropagation b) Vegetative propagation
c) Macropropagation d) Sexual reproduction

99. Read the graph and correlate the uterine events that takes place according to the hormonal levels on A. 6-15 days B. 16-25 days C. 26-28 days (if the ovum is not fertilized)



a) A-Degeneration of endometrium, B-Myometrium thickens, becomes vascularized ready to receive and implant embryo, C-Regeneration of endometrium
b) A-Degeneration of endometrium, B-Endometrium thickens, becomes vascularized, ready to receive and implant embryo, C-Regeneration of endometrium
c) A-Degeneration of endometrium, B- Endometrium thicknes, becomes vascularized, ready to receive and implant embryo, C-Regeneration of endometrium
d) A-Regeneration of endometrium, B- Endometrium thickens, becomes vascularized ready to receive and implant embryo, C-Degeneration of endometrium

100. In human beings
a) Chorion and amnion are well developed b) Allantois and yolk sac are less developed
c) Yolk cell have very little yolk d) All of the above

101. The part of fallopian tube closest to the ovary is
a) Isthmus b) Infundibulum c) Cervix d) Ampulla

102. Human male ejaculates …A… to …B… million sperm. Atleast …C… should have normal shape and size and …D… should show vigorous motility. Here A, B, C and D refers to
a) A-100, B-200, C-30%, D-40% b) A-200, B-300, C-60%, D-40%
c) A-300, B-400, C-60%, D-40% d) A-400, B-500, C-60%, D-40%

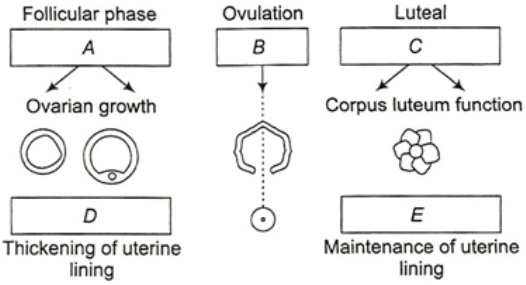
103. Acrosome secretes
a) Hyaluronic acid b) Hyaluronidase c) TSH d) Fertilizin

104. Find out the spermatogonium and spermatozoa in above figure
a) A and F b) C and D c) F and A d) D and E

105. Second meiotic division in ovum leads to the formation of
a) Haploid ovum b) Second polar body c) Tertiary polar body d) Both (a) and (b)

106. In implantation the blastocyst attached to the …… wall of uterus
a) Endometrium b) Myometrium c) Perimetrium d) Mesoderm

107. Which of the following groups of cell in the male gonad, represent haploid cells?
    a) Spermatogonial cells
    b) Germinal epithelial cells
    c) Secondary spermatocytes
    d) Primary spermatocytes
108. Parturition is
    a) Child birth
    b) Expulsion of the baby from uterus
    c) Both (a) and (b)
    d) None of the above
109. Several mammary ducts joins to form a wider mammary ampulla, which is connected to
    a) Lactiferous duct
    b) Seminiferous duct
    c) Seminiferous tubules
    d) Lactiferous canal
110. External opening of penis is called
    a) Ureter
    b) Urinary bladder
    c) Urethral meatus
    d) Prepuce
111. Insemination is
    a) A sperm injection to increase male fertility
    b) A cure of male infertility
    c) Inability of male to produce sperms
    d) The transfer of sperms by male in to the genital tract of female
112. Sertoli's cells are found
    a) Between these seminiferous tubules
    b) In the germinal epithelium of ovary
    c) In the upper part of the fallopian tube
    d) In the germinal epithelium of the seminiferous tubules
113. The maximum growth rate occurs in
    a) Stationary phase
    b) Senescence phase
    c) Lag phase
    d) Exponential phase
114. Heart is formed is embryo during …… of development
    a) 15 days
    b) One months
    c) 1.5 months
    d) 2 months
115. The figure given below illustrates the changes taking place during the human menstruation cycle



    Identify hormones A, B, C, D and E from the figures
    In the boxes shown in the figure write the name of the hormone (or hormones) controlling the stage in the human menstrual cycle
    a) A-FSH, B-LH, C-LH, D-Oestrogen, E-Progesterone
    b) A- LH, B- FSH, C-LH, D-Oestrogen, E-Progesterone
    c) A-FSH, B-LH, C- FSH, D-Oestrogen, E-Progesterone
    d) A-FSH, B-LH, C-LH, D- Progesterone, E- Oestrogen
116. Organogenesis is the formation of
    a) Organs
    b) Tissue
    c) Ova
    d) Spinal cord
117. …A… is composed of endoderm inside and splanchonopleuric extraembryonic mesoderm outside. In humans it is small and non-functional except for …B… to placenta. A and B in the statement refers to
    a) A-Allantois; B-blood vessel
    b) A- Blood vessel; B- allantois
    c) A-Amnion; B-amniotic cavity
    d) A-Endoderm; B-ectoderm
118. *In vitro fertilization* is a technique that involves transfer of which one of the following into the fallopian tube?
    a) Embryo only, upto 8 celled stage
    b) Either zygote or early embryo upto 8 celled stage

c) embryo of32celled stage
d) Zygote only

119. What happens during the follicular phase of menstrual cycle?
a) Proliferation of endometrium wall
b) Reduction of endometrium wall
c) Shadding of endometrium wall
d) No effect on endometrium wall

120. Adrenal gland is derived from
a) Ectoderm
b) Mesoderm
c) Both (a) and (b)
d) Ectoderm and endoderm

121. The males of honey bee are produced by
a) Sexually
b) Budding
c) Spore formation
d) Parthenogenesis

122. During pregnancy which one of the following is excreted?
a) hCG
b) FSH
c) LH
d) Progesterone

123. Identical twins are
a) Monozygotic
b) Isozygotic
c) Bizygotic
d) All of these

124. If for some, reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported form
a) Epididymis to vas deferens
b) Ovary to uterus
c) Vagina to uterus
d) Testes to epididymis

125. Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency?
a) Luteinizing hormone – failure of ovulation
b) Insulin - Diabetes insipidus
c) Thyroxine - Tetany
d) Parathyroid hormone - Diabetes mellitus

126. Pouch in which is the testes are suspended outside the abdominal cavity, is
a) Tunica albuginia
b) Inguinal canal
c) Epididymis
d) Scrotum

127. Hormone which causes the parturition is
a) Oestrogen
b) Oxytocin
c) Prostaglandin
d) All of these

128. Select the correct statement.
a) Cleavage follows gastrulation
b) Yolk content in egg has no role in cleavage
c) Cleavage is repeated mitotic division of zygote
d) Gastrulation and blastulation are followed by each other

129. Colostrum is important for newly born because
a) Colostrum have antigen
b) Colostrum have antibody
c) Both (a) and (b)
d) Colostrum have more nutrients than ordinary milk

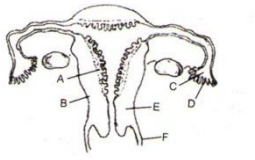
130. A pair of bulbourethral gland also called …A… gland present on the either side of …B… . It secrets …C… fluid and …D… for lubricating the penis. Here A, B, C and D are
a) A-Cowper's, B-Urethra, C-Alkaline, D-Mucous
b) A-Prostate, B-Urethra, C-Acidic, D-Mucous
c) A-Cowper's B-Scrotum, C-Acidic, D-Mucous
d) A-Prostate, B-Scrotum, C-Alkaline, D-Mucous

131. ZIFT is
a) Transfer of zygote into the fallopian tube
b) Transfer of embryo into the uterus
c) Transfer of mixture of sperms and ova into the fallopian tube
d) Transfer of mixture of sperms and ova into the uterus

132. Maturation of sperm before penetration is called
a) Spermatogenesis
b) Spermiogenesis
c) Capacitation
d) Spermatid

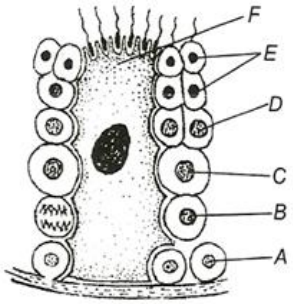
133. Attachment of blastocyst of uterine wall is called
a) Fertilization
b) Implantation
c) Deplantation
d) All of these

134. In testis, the immature germ cells produce sperm by …A… at puberty …B… present on the inside wall of seminiferous tubules multiply by …C… division and increase their number. Identify A, B and C from the above statement
    a) A-secondary spermatocytes, B-primary spermatocytes, C-mitosis
    b) A- primary spermatocytes, B- secondary spermatocytes, C-mitosis
    c) A-spermatogenesis, B-spermatogonia, C-mitosis
    d) A- spermatogonia, B- spermatogenesis, C-meiosis
135. Ovaries are the …A… sex organs which produce ovum and several steroid hormone called …B… Here A and B refers to
    a) A-secondary; B-testosterone
    b) A-tertiary; B-inhibin
    c) A-primary; B-ovarian hormones
    d) A-primary; B-testosterone
136. Ceasation of menstrual cycle at the age of 50 is called
    a) Ovulation b) Gametogenesis c) Menses d) Menopause
137. Programmed cell death is scientifically termed as
    a) Autotomy b) Cell lysis c) Apoptosis d) None of these
138. During spermatogenesis, which stage is the first to contain haploid number of chromosomes?
    a) Spermatogonium
    b) Primary spermatocyte
    c) Secondary spermatocyte
    d) Spermatid
139. The figure given below depicts a diagrammatic sectional view of the female reproductive system of humans. Which one set of three parts out of A-F have been correctly identified?



    a) C-Infundibulum, D-Fimbriae, E-Cervix
    b) D-Oviducal funnel, E-uterus, F-Cervix
    c) A-Perimetrium, B-Myometrium, C-fallopian tube
    d) B-Endometrium, C- Infundibulum, D- Fimbriae
140. Middle piece of sperm contains
    a) Mitochondria, Golgi bodies, centriole
    b) Axial filament, centriole, axial filament
    c) Mitochondria, centriole, axial filament
    d) Golgi bodies, axial filament, centriole
141. Ejaculation is the …A… response. Erection is a …B… response. Here, A and B refers to
    a) A-parasympathetic, B-sympathetic
    b) A-parasympathetic, B-parasympathetic
    c) A-sympathetic, B-parasympathetic
    d) A-sympathetic, B-sympathetic
142. The polar body of human ovum is formed
    a) Before birth b) After birth c) During birth d) Both (a) and (b)
143. Find out primary follicle and tertiary follicle in question number 114
    a) B and C b) C and D c) D and E d) A and F
144. With increasing age, secretion of which of the following reduces to almost half?
    a) GTH b) Melatonin c) hGH d) Oestrogen
145. Soon after implantation, the inner cell mass differentiation into outer ….A…. and inner …B… occurs ….C…. soon appears between ectoderm and mesoderm. A, B and C in the above sentence are
    a) A-mesoderm, B-ectoderm, C-endoderm
    b) A-ectoderm, B-mesoderm, C-endoderm
    c) A-ectoderm, B-endoderm, C-mesoderm
    d) A-mesoderm, B-endoderm, C-ectoderm
146. Luteal phase last for how many days?
    a) 15-20 days b) 15-28 days c) 15-25 days d) 15-22 days
147. Saheli is a oral contraceptive containing
    a) Oestrogen and progesterone
    b) Oestrogen
    c) Progesterone
    d) Testosterone and FSH

148. What stage of the menstrual cycle is characterized by the event labelled *A* in the figure of previous question?
   a) Corpus luteum formation
   b) Ovulation
   c) Flow
   d) Fertilization
149. Cauda epididymis lead to
   a) Vas efferens
   b) Vas deferens
   c) Ejaculatory duct
   d) Rete testis
150. After implantation, finger-like projections on the trophoblast are called …A…. which are surrounded by …B… and maternal blood.
   Here A and B refers to
   a) A-chorion; B-foetal cell
   b) A-chorionic villi; B-uterine tissue
   c) A-uterine tissue; B-chorionic villi
   d) A-foetal cell; B-chorion
151. Ovulation takes place in menses between
   a) 9-14 days
   b) 14-16 days
   c) 16-28 days
   d) 20-26 days
152. Male's testes are contained in the scrotal sacs because
   a) Other organs do not make space of the testes in the abdominal cavity
   b) Testes in the abdomen will hamper maturation of sperms
   c) It provides temperature that is slightly lower than body temperature required for formation of functional sperms
   d) It facilitates ejaculation
153. Two major entities seen in human testis TS are
   a) Sertoli cells and interstitial cells
   b) Spermatozoa and Sertoli cells
   c) Seminiferous tubules and Leydig cells
   d) Seminiferous tubules and Sertoli cells
154. Oviducts are also called
   a) Fallopian tubes
   b) Uterus
   c) Vagina
   d) Ovary
155. Seminal plasma in human males in rich in
   a) Fructose and calcium
   b) Glucose and Calcium
   c) DNA and testosterone
   d) Ribose and potassium
156. Given a diagram showing a portion of a seminiferous tubule. Identify the marked alphbates



   a) A-Sertoli cells, B-Spermatogonium, C-Primary spermatocyte, D-Secondary spermatocyte, E-Spermatids, F-Leydig cell
   b) A- Leydig cells, B- Primary spermatocyte, C- Spermatogonium, D-Secondary spermatocyte, E-Spermatids, F- Sertoli cells
   c) A- Leydig cells, B-Spermatogonium, C-Primary spermatocyte, D-Secondary spermatocyte, E-Spermatozoa, F- Sertoli cell
   d) A- Leydig cells, B-Spermatogonium, C-Primary spermatocyte, D-Secondary spermatocyte, E-Spermatids, F- Sertoli cell
157. The egg of frog is
   a) Telolecithal
   b) Microlecithal
   c) Alecithal
   d) centrolecithal
158. Which hormone level reaches peak during luteal phase of menstrual cycle?
   a) Luteinizing harmone
   b) Progesterone

c) Follicle stimulating harmone d) Oestrogen

159. Skin epidermis, tooth, enamel, lens and corner of outer ear, brain, spinal cord, skeletal muscles of human head are derived from
a) Ectoderm b) Mesoderm c) Endoderm d) Both (c) and (d)

160. Primary sex organ is males is
a) Testes b) Sertoli cells c) Ovum d) Spermatogonia

161. The signals for parturition originates from
a) Placenta only b) Placenta as well as fully developed foetus
c) Oxytocin released from maternal pituitary d) Fully developed foetus only

162. Infertility could develop when the sperm cells display
a) A count of 120 million/mL semen b) Increased acrosomal activity
c) Normal morphology d) Count of less than 20 million/mL semen

163. Exact time of human gestation period is
a) 9 month $\pm$ 15 days b) 9 month $\pm$ 20 days c) 9 month $\pm$ 7 days d) 9 month $\pm$ 1 days

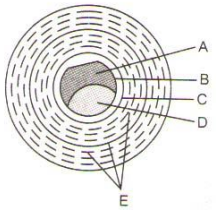
164. Vitellogenesis occurs during the formation of
a) Primary oocyte in the Graafian follicle
b) Oogonial cell in the Graafian follicle
c) Ootid in the fallopian tube
d) Secondary oocyte in the fallopian tube

165. In mammals, corpus luteum is found in which organ?
a) Brain b) Ovary c) Liver d) Eyes

166. External genitalia develops in the …… of development
a) 2nd month b) 5th month c) 3rd month d) 1st month

167. Acrosome is the modified
a) Mitochondria b) Lysosome c) Golgi body d) Nucleus

168. The following is a diagram of the just spawned frog's egg; with the parts labelled from A to E. identify the parts and choose the correct option from those given figure.

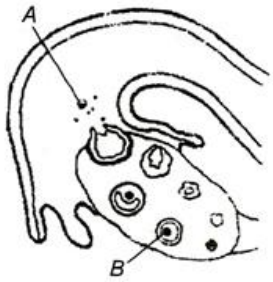


a) A –cytoplasm, B-plasma membrane, C-vitelline membrane, D-yolk, E-jelly coat
b) A –cytoplasm, B- vitelline membrane, C- plasma membrane, D-yolk, E-jelly coat
c) A -yolk, B- plasma membrane, C- vitelline membrane, D- cytoplasm, E- jelly coat
d) A - yolk, B-jelly coat, C- vitelline membrane, D-cytoplasm, E-plasma membrane

169. The chemical substance released by activated spermatozoa that acts on the ground substances of the follicle cells is known as
a) Progesterone b) Hyaluronidase c) Relaxin d) Gonadotropin

170. The haemoglobin of a human foetus
a) Has lower affinity for oxygen than that of the adult b) has affinity for oxygen same as that of an adults
c) Has only two protein subunits instead of four d) Has higher affinity for oxygen than that of an adult

171. When did the structure labelled *B* in the given figure starts to form



a) Infancy
b) Before birth
c) At the start of the menstrual cycle
d) At puberty

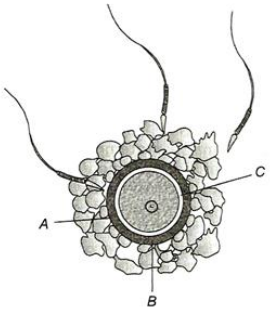
172. In human, cleavage/divisions are
a) Slow and synchronous
b) Fast and synchronous
c) Show and asynchronous
d) Fastand asynchronous

173. There is no DNA in
a) An enucleated ovum
b) Mature RBCs
c) A mature spermatozoan
d) Hair root

174. Natural parthenogenesis is found in
a) Housefly
b) Honey bee
c) *Drosophila*
d) All of these

175. Inner cell mass contains certain cells called ……, which have the potency to give rise to all the tissues and organs. The suitable word for blank in the above sentence is
a) Stem cell
b) Germ cell
c) Mesodermal cell
d) Special cell

176. The given diagram refers to ovum surrounded by few sperms. Identify *A*, *B* and *C* in the diagram



a) A-Zona pellucida, B-Perivitelline space, C-Corona reticulata
b) A-Zona pellucida, B-Viteline membrane, C-Corona radiata
c) A-Zona pellucida, B-Perivitelline space, C-Corona radiata
d) A-Oolemma, B-Perivitelline space, C-Corona radiata

177. Which chemical event of fertilization involves the presence of hyaluronidase enzyme?
a) Acrosomal reaction
b) Cortical reaction
c) Amphimixis
d) Activation of egg

178. Leydig's cells are concerned with
a) Ovary
b) Seminiferous tubule
c) Liver
d) Pituitary gland

179. Tunica albugenia is the covering of
a) Liver
b) Spleen
c) Testis
d) Penis

180. Which of the following cells present in the mammalian testis and nourishes the sperm?
a) Leydig cells
b) Oxyntic cells
c) Interstitial cell
d) Sertoli cell

181. Progesterone is needed for the maintenance
a) Of ovary
b) Of ovum
c) Of endometrium wall
d) Of ootid

182. The target ICSH is
a) Prostate
b) Seminiferous tubule
c) Interstitial cells
d) Seminal vesicle

183. Proliferation of endometrium of uterus is controlled by

a) Relaxin b) Oxytocin c) Progesterone d) Oestrogen

184. Sugar fructose is present in the secretion of
a) Bartholin's gland b) Cowper's gland c) Seminal vesicles d) Prostate gland

185. …A… are the certain agents that causes abnormal development in the developing embryo. The most well known is …B… which causes phenomelia is foetus
a) A-Barbiturates, B-anesthetic
b) A-Thalidomide, B-teratogens
c) A-Teratogens, B-thalidomide
d) A-Aspririn, B-anesthetis

186. The number of autosomes in human primary spermatocyte is
a) 46 b) 44 c) 23 d) 22

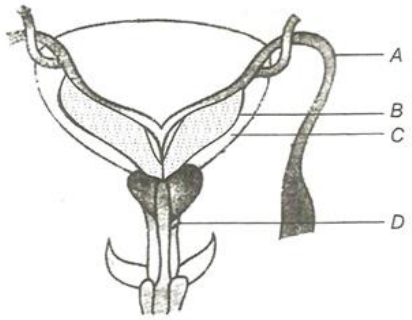
187. Seminal vesicles are present at the base of
a) Penis b) Bladder c) Testis d) Prostate gland

188. The main function of fimbriae of Fallopian tube is
a) Help in development of ovary
b) Help in collection of the ovum after ovulation
c) Help in development of ova
d) Help in fertilization

189. Saheli is a
a) Oral contraceptive for females b) Surgical sterilization method for females
c) Diaphragm for females d) Surgical method of sterilization in males

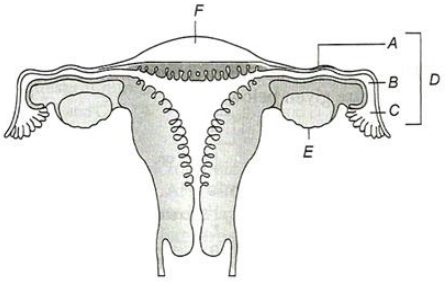
190. The nutritive cells found in seminiferous tubules are
a) Leydig cells b) Sertoli cells c) Spermatogonial cells d) Follicular cells

191. Label A, B, C, D in following diagram



a) A-Ureter, B-Seminal vesicle, C-Prostate, D-Bulbourethral gland
b) A-Ureter, B-Prostate, C- Seminal vesicle, D-Bulbourethral gland
c) A-Vas deferens, B-Seminal vesicle, C-Prostate, D-Bulbourethral gland
d) A- Vas deferens, B-Vesicle, C-Bulbourethral gland, D-Prostate

192. The following diagram refers to the female reproductive system of human. Identify A to F



a) A-Ampulla, B-Isthums, C-Infundibulum, D-Fallopian tube, E-Ovary, F-Uterine fundus
b) A- Isthums, B- Infundibulum, C- Ampulla, D-Fallopian tube, E-Ovary, F-Uterine fundus
c) A- Isthmus, B- Ampulla, C-Infundibulum, D-Fallopian tube, E-Ovary, F-Uterine fundus
d) A-Ampulla, B- Infundibulum, C-Isthmus, D-Fallopian tube, E-Ovary, F-Uterine fundus

193. Identify the odd one

a) Labia minora b) Fimbriae c) Infundibulum d) Isthmus

194. FSH is given to a rat which don't have anterior lobe of pituitary. What will not happen in rat?
a) Proliferation of endometrium
b) Development of corpus luteum
c) Maturation of Graafian follicle
d) Build-up of oestrogen in blood stream

195. Ejaculatory duct contains
a) Sperms b) Secretion of seminal vesicles
c) Both (a) and (b) d) Androgen

196. At what stage in test tube babies, the zygote is implanted in human female?
a) 32-celled stage b) 64-celled stage c) 100-celled stage d) 164-celled stage

197. Notochord, skeletal system and dermis of the skin are the derivatives of
a) Mesoderm b) Endoderm c) Ectoderm d) All of these

198. Chorionic villi are formed by the modification of
a) Outer layer of trophoblast b) Inner layer of trophoblast
c) Inner mass cell d) Blastocyst

199. Male pronucleus is
I. Head of sperm
II. Neek of sperm
III. Middle piece of sperm
IV. Tail of sperm
a) I and III b) III and IV c) I d) II and IV

200. Hormones plays a very significant role in puberty. …A… secreted by …B… stimulates …C… lobe of pituitary to secrete …D… and …E… hormones. Testosterone brings developmental of secondary sex organs and secondary characters.
A, B, C, D and E in the above statement are
a) A-FSH, B-hypothalamus, C-posterior, D-LH, E-ICSH
b) A-GnRH, B-hypothalamus, C-anterior, D-LH, E-FSH
c) A- GnRH, B- anterior, C- hypothalamus, D-LH, E- FSH
d) A- GnRH, B-hypothalamus, C-posterior, D-LH, E- FSH

201. Which cells come earliest in the sequence of sperm production?
a) Spermatozoa b) Spermatocyte c) Spermatid d) Spermatogonia

202. Superficial meroblastic cleavage occurs in
a) Reptiles b) Birds c) Mammals d) Insects

203. Which of the following is viviparous?
a) Running birds b) Whales c) Bats d) Both (b) and (c)

204. The dominant hormone controlling the proliferative phase of the uterine endometrium is
a) Oestrogen b) FSH c) LH d) Progesterone

205. Test tube baby means a baby born when
a) The ovum is fertilized externally and thereafter implanted in the uterus
b) It develops from a non-fertilized egg
c) It is developed in a test tube
d) It is developed through tissue culture method

206. Withdrawal of which of the following hormones is the immediate cause of menstruation?
a) Oestrogen b) FSH c) FSH-RH d) Progesterone

207. Fertilization takes place in
a) Cervix
b) Isthmus
c) Ampullary isthmic junction
d) Follicle

208. In teloecithal egg
a) Yolk is present in the centre
b) Yolk is unevenly distributed
c) Yolk is absent
d) Yolk is present all over the ovum

209. Which hormone is produced throughout the menstrual cycle?
a) FSH
b) Oestrogen
c) LH
d) Progesterone

210. Accessory sexual character in female is promoted by
a) Androgen
b) Progesterone
c) Oestrogen
d) Testosterone

211. Uterine endometrium, epithelial glands and connective tissue are broken in menstrual phase. This is due to
a) Over secretion of FSH
b) Lack of oestrogen
c) Lack of progesterone
d) Over production of progesterone

212. Which one of the following statements is incorrect about menstruation?
a) During normal menstruation about 40 mL blood is lost
b) The menstrual fluid can easily clot
c) At menopause in the female, there is especially abrupt increase in gonadotropic hormones
d) The beginning of the cycle of menstruation is called menarche

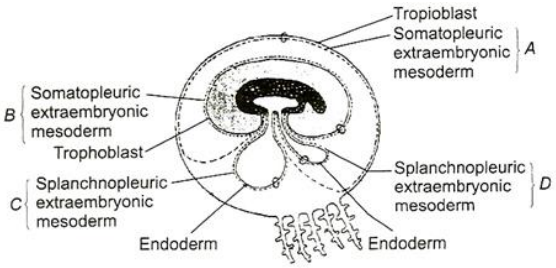
213. Ovulatory phase lasts for
a) 1 day
b) 2 days
c) 3 days
d) 4 days

214. In the beginning of menstruation what will happen?
a) Ovulation takes place
b) Corpus luteum degenerates
c) Levels of LH and FSH increases
d) Progesterone and oestrogen land increase

215. Type of cell division taking place at I, II and III stages of previous question are
a) I-meiosis, II-mitosis, III-mitosis-II
b) I- mitosis, II-mitosis, III- meiosis
c) I-meiosis-I, II- meiosis-II, III-mitosis
d) I- mitosis, II-mitosis-I, III- meiosis -II

216. Fusion of dissimilar gametes is known as
a) Fertilization
b) Dichogamy
c) Autogamy
d) Allogamy

217. Identify A, B, C and D in the figure given below



a) A-Yolk sac, B-Amnion, C-Allantois, D-Chorion
b) A-Chorion, B-Amnion, C- Yolk sac, D- Allantois
c) A-Chorion, B-Amnion, C-Allantois, D- Yolk sac
d) A-Chorion, B- Allantois, C- Amnion, D- Yolk sac

218. At the time of birth, the oocyte have the stage
a) Prophase-I
b) Prophase-II
c) Meiosis-II
d) Mitosis

219. Vaginal orifice, urethral orifice are open in
a) Vulva
b) Labia majora
c) Labia minora
d) Cervix

220. The extra-embryonic membranes of mammalian embryo are derived from
a) Trophoblast
b) Follicle cells
c) Formative cells
d) Inner cell mass

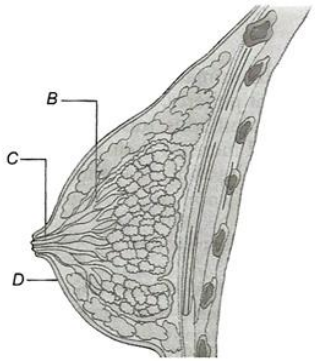
221. Relaxin (a hormone) is secreted by
a) Placenta
b) Ovary
c) Anterior lobe of pituitary
d) Posterior lobe of pituitary

222. Leydig cells secretes …. hormone

a) Testosterone b) Inhibin c) Oxytocin d) FSH

223. Which of the following is correct about mammalian testes?
a) Graafian follicles, sertoli's cells, Leydig's cells b) Graafian follicles, sertoli's cells, seminiferous tubules
c) Sertoli's cells, seminiferous tubules, Leydig's cells, d) Graafian follicles, Leydig's cells, seminiferous tubules

224. Given the diagrammatic sectional view of mammary gland. Identify *A*, *B*, *C* and *D*



a) A-Alveolus, B-Mammary duct, C-Lactiferous duct, D-Areola b) A-Alveolus, B- Lactiferous duct, C- Mammary duct, D-Areola
c) A-Alveolus, B-Mammary duct, C-Lactiferous duct, D-Lactogenic spot d) A- Mammary gland, B-Mammary duct, C-Lactiferous duct, D-Areola

225. During oogenesis, the small structure separated from egg is
a) Polar bodies b) Secondary endosperm
c) Herring bodies d) Hela cells

226. Structure connecting the foetus to placenta is
a) Umbilical cord b) Amnion c) Yolk sac d) Chorion

227. Sperm is a microscopic structure composed of head, neck, …A… and …B… Sperm head contains elongated haploid nucleus, which is covered by cap like structure called …C… .
A, B and C in the above statement refers to
a) A-middle piece, B-tail, C-acrosome
b) A- tail, B- middle piece, C-acrosome
c) A- tail, B- acrosome, C- middle piece
d) A-middle piece, B- acrosome, C- tail

228. Which part of the sperm is motile?
a) Head b) Neck c) Middle d) Tail

229. Cytoplasm of ovum does not contain
a) Golgi complex b) Centrosomes c) Mitochondria d) Ribosomes

230. Appearance of hair on head is observed during …… of development
a) 2nd month b) 3rd month c) 4th month d) 5th month

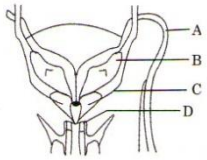
231. A. Humans reproduces…..
B. Humans are…….
C. Fertilization is …. in humans
D. Male and female gametes are…..
E. Zygote is…..
F. The process of release of ovum from a mature follicle is called…..
G. Ovulation is induced by a hormone called……
H. The fusion of male and female gametes is called…….
I. Zygote divides to form… which is implanted in uterus
J. The structure which provides vascular connection between foetus and uterus is called……
Blanks in the statements A to J in the above statement is
a) A-asexually, B-viviparous, C-external, D-diploid, E-haploid, F-ovulation, G-LH, H-fertilisation, I-blastocyst, J-placenta

b) A-sexually, B-viviparous, C-external, D- haploid, E- diploid, F-ovulation, G-LH, H-fertilisation, I-blastocyst, J-placenta

c) A-asexually, B-viviparous, C-internal, D- haploid, E- diploid, F-ovulation, G-LH, H-fertilisation, I-blastocyst, J-placenta

d) A-sexually, B-viviparous, C-internal, D- haploid, E- diploid, F-ovulation, G-LH, H-fertilisation, I-blastocyst, J-placenta

232. Given below is a diagrammatic sketch of a portion of human male reproductive system. Select the correct set of the names of the parts labelled A, B, C, D.



	A	B	C	C
a)	Ureter	prostate	seminal vesicle	bulbourethral gland
c)	Vas deferens	seminal vesicle	bulbourethral gland	prostate

b)	Vas deferens	Seminal vesicle	prostate	bulbourethral gland
d)	Ureter	seminal vesicle	prostate	bulbourethral gland

233. Blastopore is found in

a) Blastula and is opening of archenteron
b) Blastula and is opening of blastocoels
c) Gastrula and is opening of archenteron
d) Gastrula and is opening of blastocoels

234. Seminal vesicle secretes 60% of semen content, these contents are

a) Glucose, prostaglandin, clotting protein
b) Cellulose, prostaglandin, clotting factor
c) Fructose, prostaglandin, clotting protein
d) Glyceraldehyde 3-phosphate, prostaglandin, clotting factor

235. A sectional view of mammary gland shows

I. Nipple areola
II. Mammary lobes (alveolus) and duct
III. Antibody and ribs
IV. Ampulla and lactiferous duct

Choose the correct option from the above

a) I, II, IV
b) I, II, III
c) III, IV, II
d) I, IV, III

236. The Bartholin glands of female resembles the male's

a) Cowper's gland
b) Vastibular gland
c) Seminal vesicles
d) Prostate gland

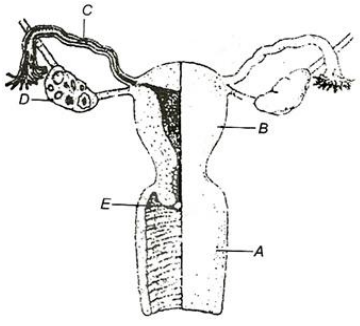
237. Cleavage in frog's zygote is

a) Diplobalstic
b) Heteroblastic
c) Holoblastic
d) meroblastic

238. Post-embryonic period is also called

a) Prenatal
b) Postnatal
c) Embryonal period
d) None of the above

239. Match each function below with its associated part (or parts) of the human female reproductive system shown in the figure



I. Where is the egg produced?
II. Where does fertilization occur?
III. Where would implantation of a fertilized egg take place?

IV. Where are oestrogen and progesterone produced?
V. What part receives the penis during copulation?

a) I-D, II-C, III-B, IV-E, V-A
b) I-D, II-C, III-B, IV-A, V-E
c) I-D, II-C, III-B, IV-D, V-A
d) I-E, II-C, III-B, IV-D, V-A

240. Spermatogenesis starts at puberty due to
a) GnRH b) Lactin c) Testosterone d) Oestrogen

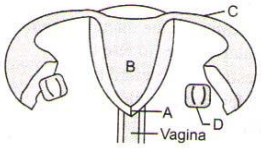
241. Mark the odd one
a) Acrosome b) Endometrium c) Corpus luteum d) Graafian follicle

242. Name the hormone, which stimulates growth and development of breast in preparation for lactation?
a) Oestrogen
b) Human placental lactogen
c) Progesterone
d) Chorionic gonadotropin

243. At which stage of the development, ovum is released from the ovary of human female?
a) Primary oocyte b) Oogonium c) Secondary oocyte d) Ootid

244. The 60% of semen is produced by the
a) Prostate gland b) Seminal vesicle c) Cowper's gland d) Testes

245. Choose the correct combination of the labelling for the following structure.

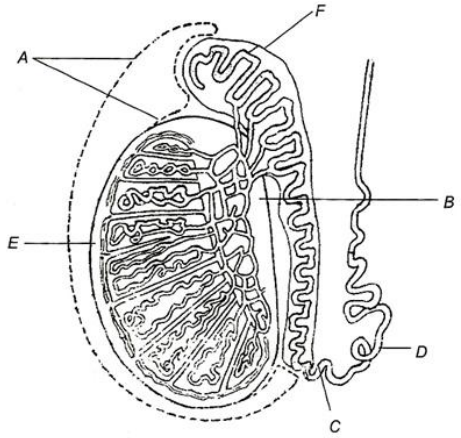


a) A-Oviduct, B-Uterus, C-Cervix, D-Ovary
b) A- Cervix, B-Uterus, C-Ovary, D- Tumor
c) A- Uterus, B-Uterus cavity, C-Oviducal funnel, D-Ovary
d) A- Cervix, B- Uterine cavity, C-Fallopian tube, D-Ovary

246. Foetus develops limbs and digits in its … of development
a) 2nd month b) 3rd month c) 4th month d) 5th month

247. Spermatogenesis is induced by
a) FSH b) ACTH c) ICSH d) ATH

248. Identify *A* to *F* in the diagram given below



a) A-Tunica vaginalis, B-Rete testis, C-Caput epididymis, D-Vas deferens, E-Septa of testis, F-Cauda epididymis
b) A-vaginalis, B-Rete testis, C- Cauda epididymis, D-Mediastinum testis, E- Vas deferens, F- Caput epididymis
c) A-Tunica vaginalis, B-Rete testis, C- Cauda epididymis, D-Vas deferens, E-Tunica albuginea, F- Caput epididymis
d) A-Tunica vaginalis, B-Rete testis, C-Caput epididymis, D- Mediastinum testis, E- Vas deferens, F-Cauda epididymis

249. Sertoli's cells are nourishing cells in the testis. They also secrete a hormone. Identify the same
a) Gonadotropin b) Testosterone c) Relaxin d) Inhibin

250. Through invagination of which of the following, mesoderm is formed?

a) Primitive streak b) Inner mass of cell c) Endoderm d) Ectoderm

251. The receptor site of acrosome are exposed and become active to penetrate the egg. This process is called
a) Activation b) Capitation c) Reactivation d) Deactivation

252. Primary oocyte surrounded by a layer of granulosa cells is called
a) Secondary follicle b) Ootid c) Primary follicle d) Tertiary follicle

253. In human secretion, which of the following is used to confirm implantation of emryo?
a) Gastrula b) Trophoblast c) Inner mass of cell d) Blastocyst

254. When both ovaries are removed from rat, which hormone is decreased in blood?
a) Oxytocin b) Prolactin
c) Oestrogen d) Gonadotrophic releasing factor

255. Study the following sentences.
V. Testosterone influences the male secondary sexual characters.
VI. Gestation period in rabbit is approximately 276 days.
VII. Bulbourethral glands secrete a vaginal lubricant.
VIII. Placenta secretes oestrogen
Identify the correct statements.
a) I and IV b) II and III c) III and IV d) I and II

256. Secretion from which of the following structures is preparing inner wall of uterus for implantation?
a) Ovary b) Pituitary gland c) Corpus luteum d) Ovarian follicle

257. At the time of implantation, the human embryo is called
a) Embryo b) Blastocyst c) Zygote d) Foetus

258. Vas deferentia receives a duct from …A… and opens into the …B… as ejaculatory duct.
A and B in above statement is
a) A-vas deferens; B-urinary bladder b) A-seminal vesicles; B-urethra
c) A-urethra; B-seminal vesicles d) A-urethra; B-urinary bladder

259. In numans, dermis of skin, circulatory system and muscles are derived from
a) Mesoderm b) Ectoderm c) Endoderm d) Both (a) and (b)

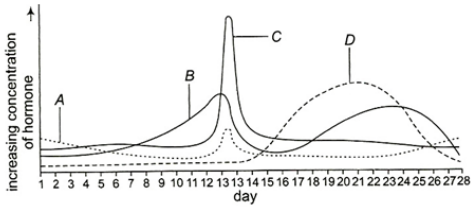
260. …A… completely surrounds the embryo and protect it. It also take part in formation of ….B… .
A and B here refers to
a) A-Chorion; B-Placenta b) A-Ammion; B-Amniotic cavity
c) A-Allantois; B-Endoderm d) A-Yolk sack; B-Endoderm

261. Cu ions released from copper- releasing Intra Uterine Devices (IUDs)
a) Make uterus unsuitable for implantation b) Increase phagocytosis of sperms
c) Suppress sperm motility d) Prevent of ovulation

262. Which one of the following is the most widely accepted method of contraception in India, at present?
a) Tubectomy b) Diaphragm
c) IUDs (intra uterine devices) d) Cervical caps

263. Which of the following undergoes, the meiosis-I division?
a) Primary spermatocytes b) Secondary spermatocytes
c) Sertoli cell d) Leydig cell

264. The following graph of relative concentrations of the four hormones present in the blood plasma of a woman during her menstrual cycle. Identify the hormones A, B, C and D



a) A-FSH, B-Progesterone, C-LH, D-Oestrogen
b) A- LH, B-Progesterone, C- FSH, D-Oestrogen
c) A-FSH, B- Oestrogen, C-LH, D- Progesterone

d) A- LH, B- Oestrogen, C- FSH, D- Progesterone

265. A chemical fertilizin is produced from
   a) Polar bodies
   b) Middle piece of sperm
   c) Acrosome
   d) Mature eggs

266. Milk secretion is maintained by …A… . This hormone inhibits the release from the pituitary and counters the …B… and …C… . Hence in nourishing mother, the menstrual cycle is suppressed. Here A, B and C are
   a) A-FSH, B-LH, C-prolactin
   b) A-prolactin, B-FSH, C-LH
   c) A-LH, B-FSH, C-prolactin
   d) A-LH, B-prolactin, C-FSH

267. Which one of the following events is correctly matched with the time period in a normal menstrual cycle?
   a) Release of egg - 5th days
   b) Endometrium regenerates - 5 -14 days
   c) Endometrium secretes Nutrients for implantation - 11-18days
   d) Rise in progesterone level - 1-15 days

268. A single ejaculation contains …A… to …B… million spermatozoa. Semen has pH of …C… to …D… . Its alkalinity helps to neutralize the acidity of urethra. Here A, B, C and D refers to
   a) A-300, B-400, C-8, D-9
   b) A-200, B-300, C-7.35, D-7.50
   c) A-100, B-200, C-5, D-6
   d) A-150, B-200, C-7, D-8

269. Some important events in the human female reproductive cycle are given below. Arrange the events in proper sequence.
   I.Secretion of FSH
   II.Growth of cropus luteum
   III.Growth of the follicle and oogenesis
   IV.Ovulation
   V.Sudden increase in the levels of LH
   a) III → I → IV → II → V
   b) I → III → V → IV → II
   c) I → IV → III → V → II
   d) II → I → III → IV → V

270. Mammary gland is a
   a) Modified sweat gland
   b) Modified perineum
   c) Modified ear wax gland
   d) Both (a) and (c)

271. The tertiary follicle changes into
   a) Graafian follicle
   b) Oocyte
   c) Megaspore mother cell
   d) ovum

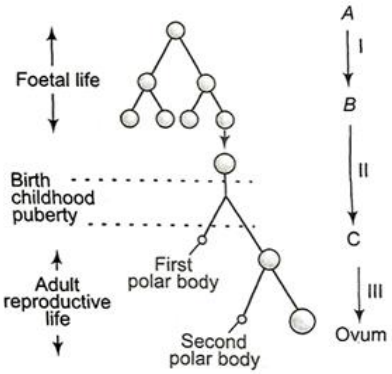
272. Male accessory glands includes …A…, …B… and …C… . Here A, B and C represents
   a) A-one seminal vesicle, B-a pair of prostate gland, C-a bulbourethral gland
   b) A-pair of seminal vesicle, B-prostate gland, C-a pair of bulbourethral gland
   c) A-two pairs of seminal vesicle, B-two pairs of prostate gland, C-two pairs of bulbourethral gland
   d) A-three pairs of seminal vesicle, B-three pairs of prostate gland, C-three pairs of bulbourethral gland

273. GnRH stimulates two hormones from anterior lobe of pituitary
   a) FSH and GH
   b) FSH and LH
   c) LH and testosterone
   d) Testosterone and LH

274. Female gamete mother cell are called
   a) Oogonia b) Ovum c) Ootid d) Oocyte

275. Why the fusion of sperm and ova do not occur during pregnancy?
   a) High levels of oestrogen and progesterone maintained by corpus luteum or placenta during pregnancy inhibit the secretion of gonadotropin and ovulation
   b) Woman cannot intercourse during pregnancy
   c) High level of HCl kill the releasing ovum
   d) The ova releasing during pregnancy is abnormal

276. Identify of A, B and C in the figure given below



   a) A-Secondary oocyte, B-Oogonia, C-Primary oocyte
   b) A- Oogonia, B- Primary oocyte, C- Secondary oocyte
   c) A-Secondary oocyte, B- Primary oocyte, C- Oogonia
   d) A- Oogonia, B- Secondary oocyte, C-Primary oocyte

277. $2n=16$ is a primary spermatocyte, which is in metaphase of first meiotic division. What shall be the total number of chromatids in each of the secondary spermatocyte?
   a) 32 b) 8 c) 16 d) 24

278. Which of the following statement is correct?
   a) hCG, hPL and relaxin are produced women only during pregnancy
   b) During pregnancy the level of other hormones like oestrogens, progestogens, cortisol, prolactin, thyroxine, etc., are increased several folds in the maternal blood
   c) Increased production of hcG, hPL, progesterone, etc., is essential for supporting the foetal growth, metabolic changes in the mother and maintenance of pregnancy
   d) All of the above

279. …A… are the paired folds of tissue under the labia majora. The opening of vagina is covered partially by …B… …C… is the finger-like projection, which lies at the upper junction of two labia minora and urethral opening.
   A, B and C in the above statements are
   a) A-Labia minora, B-Hymen, C-Clitoris
   b) A-Labia minora, B- Clitoris, C- Hymen
   c) A- Hymen, B-Clitories, C- Labia minora
   d) A- Hymen, B- Labia minora, C- Labia majora

280. The seminiferous tubules of the testis opens into the vasa efferentia by
   a) Vasa deferentia
   b) Rete testis
   c) Epididymis
   d) Seminiferous tubules

281. …A… is made up of trophoblastic mesoderm inside and somatopleuric extraembryonic mesoderm outside. The space between embryo and the amnion is called …B… which is filled with clear watery fluid secreted by both embryo and membrane. It protects the embryo from shock and desiccation. A and B in above sentence are
   a) A-Chorion; B-Placenta
   b) A-Amnion; B-Amniotic cavity
   c) A-Chorion; B-Amniotic cavity
   d) A-Yolk sac; B-Amniotic cavity

282. Placenta secretes
   a) hCG (Human Chorionic Gonadotrophin)
   b) Human placental lactogen
   c) Oestrogen
   d) All of the above

283. Scrotum remains connected with abdomen or pelvic cavity by

a) Spermatic cord b) Inguinal canals c) Testis d) Lobules

284. Hormone responsible for ovulation is
a) LH b) FSH c) Progesterone d) Testosterone

285. Wall of each seminiferous tubules is formed of a single layer called
a) Germinal epithelium
b) Germ cell
c) Spermatogonia
d) Spermatozoa

286. Reproduction in larval stage is called
a) Neoteny b) Parthenogenesis c) Parthenocarpy d) Paedogenesis

287. The …A… secrete human chorionic gonadotropin hormone. The hCG maintains the …B… and stimulates it to secrete …C… The latter maintains the …D… of the uterus and causes it to grow throughout pregnancy This also prevents …E… Progesterone also cause increased secretion of mucous in the cervix of the uterus that forms a protective plug during pregnancy
A to E in above paragraph, is
a) A-trophoblastic cell, B-corpus luteum, C-progesterone, D-endometrium, E-menstruation
b) A-trophoblast, B-corpus luteum, C-progesterone, D- menstruation, E- endometrium
c) A-trophoblast, B-corpus luteum, C- endometrium, D- menstruation, E- progesterone
d) A-trophoblast, B- progesterone, C- corpus luteum, D- menstruation, E- endometrium

288. Human placenta is derived from
a) Ectoderm b) Trophoblast c) Endoderm d) Mesoderm

289. In which of the following animal, cleavage divisions are restricted to a small part of cytoplasm and nucleus in animal pole of egg?
a) Cockroach b) Frog c) Chick d) Rabbit

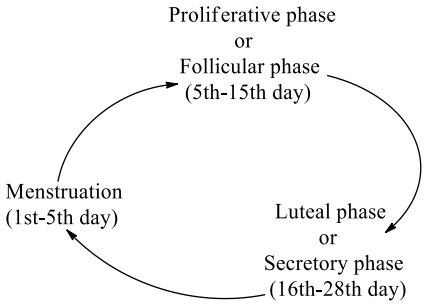
290. Fertilization is
a) Fission of sperm and ova
b) Fusion of sperm and ova
c) Zygote formation
d) Gamete formation

291. Maturation of sperm before penetration is called
a) Spermatogenesis b) Spermiogenesis c) Capacitation d) Spermatid

292. At menopause, there is rise in urinary excretion to
a) FSH b) STH c) LH d) MSH

293. Identify E, F, G and H in the diagram of previous question
a) E-Glans penis, F-Foreskin, G-Testis, H-Urethra
b) E-Testis, F-Foreskin, G-Glans penis, H-Urethra
c) E-Urethra, F-Testis, G-Foreskin, H-Glans penis
d) E-Glans penis, F-Foreskin, G-Testis, H-Urethra

294. The events of the menstrual cycle are represented below. In which of the following option the level of FSH, LH an progesterone is mentioned correctly



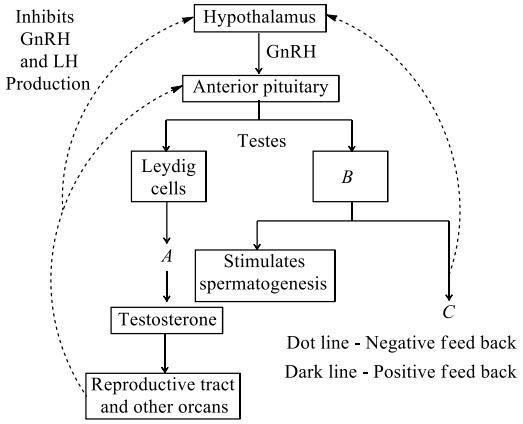
13-14 Day	**21st to 23rd day**

	FSH	LH	Progesterone	FSH	LH	Progesterone
a)	High	High	Low	Low	Low	High
b)	High	High	High	Low	Low	Low
c)	Low	Low	Low	High	High	High
d)	Low	Low	High	High	Low	Low

295. Mammary glands are modified
a) Sweat gland b) Sebaceous gland c) Lacrimal gland d) Endocrine gland

296. Primary sex organ in man is
a) Scrotum b) Accessory gland c) Testis d) Urinary bladder

297. Find out *A*, *B* and *C* in the figure given below



a) A-Sertoli cell, B-Testosterone, C-Inhibin
b) A- Inhibin, B- Sertoli cell, C-Testosterone
c) A-Testosterone, B-Sertoli cell, C-Inhibin
d) A-Testosterone, B-Sertoli cell, C-Testosterone

298. In menstrual phase, the production of LH considerably
a) Reduced b) Increases c) Does not change d) None of these

299. Cytoplasm surrounding mitochondria present in the middle piece of sperm is
a) Manchette b) Centroplasm c) Microplasm d) Acrosome

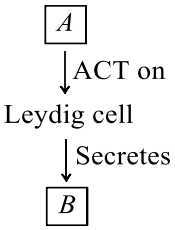
300. During menstrual phase, the hormones which show reduction in sufficient quantity are
a) Progesterone b) LH c) Inhibin d) Both (a) and (b)

301. A woman with a typical 28 day menstrual cycle is most likely to become pregnant as a result of sexual intercourse on ….. of cycle
a) 1-3 days b) 5-8 days c) 12-15 days d) 24-28 days

302. What is the purpose of polar bodies during oogenesis?
a) Polar bodies serves both as a dumping ground for extra sets of chromosomes and ensure that the ovum will have most of the cytoplasm
b) They rid the body of defective sets of chromosomes, leaving the 'good' set within the ovum
c) They are merely the by-product of meiosis and serve no function
d) They prevent the development of most sets of multiple birth

303. Funnel-shaped part closer to the ovary is called
a) Filmbriae b) Infundibulum c) Ampulla d) Isthmus

304. Give the name of two hormones *A* and *B* in the figure given below



a) FSH and GH b) LH and androgen c) GH and LH d) GH and lactin

305. Which of the following represents a condition, where the motility of the sperms is highly reduced?
a) Oligospermia b) Athenospermia c) Azoospermia d) Poolyspermy

306. Male reproductive system contains a pair of …A… along with accessory …B… and …C… and an external …D… . Here A, B, C, and D refers to
a) A-genitalia, B-glands, C-ducts, D-testis
b) A- testis, B-glands, C-ducts, D- genitalia
c) A-urethra, B-testis, C-foreskin, D-rete testis
d) A-uterus, B-vasa deferentia, C-epididymis, D-rete testis

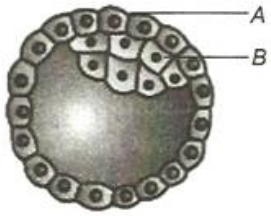
307. The wolffian duct gives rise of
a) Scrotum b) Labia majora c) Both (a) and (b) d) Epididymis

308. Second meiotic division in ova takes place
a) After ovulation b) After spermatogenesis
c) After fusion of sperm and ova d) After sperm reaches to the oviduct

309. Which of the given option maintains?
I. Endometrium wall
II. Pregnancy
a) Graafian follicle b) Secondary oocyte c) Corpus luteum d) Corona radiata

310. Which of the following provides nutrition to sperm?
a) Leydig's cell b) Scrotum c) Sertoli's cell d) Epididymis

311. Identify *A* and *B* and their respective functions



	A	B	Function of *A*	Function of *B*
a)	Trophoblast	Inner cell Mass	get attached to the endometrium	differentiated as embryo
b)	Inner cell Mass	Trophoblast	get attached to the endometrium	differentiated as embryo
c)	Trophoblast	Inner cell Mass	differentiated as embryo	get attached to the endometrium
d)	Ectoderm	Endoderm	differentiated as embryo	get attached to the endometrium

312. The leydig's cells secrete
a) Oestrogen b) Testosterone c) Progesterone d) Corticostierone

313. Germinal epithelium gives rise to
a) Sertoli cells b) Interstitial cells c) Spermatogonium d) Scrotum

314. The cells of the trophoblast in contact with inner mass of cells, are called
a) Cells of embryo
b) Cells of rauber

c) Cells of organogenesis
d) Cells of blastula

315. The cell division that takes place in a zygote is known as
a) Meiosis b) Mitosis c) Cleavage d) Differentiation

316. If the size of a fertilized egg of frog is compared with the size of its blastula and gastrula stages, which of the following observations will be correct?
a) There is a progressive increase in size from zygote to blastula to gastrula
b) All the three will be of the same size
c) Zygote will be smaller, while blastula and gastrula will be larger
d) Gastrula will be larger, while zygote and blastula will be of same size

317. Bartholin glands are also called
a) Vestibular glands b) Lenticular glands c) Rudimentary glands d) Does not exist

318. Sperm acrosome is derived from
a) Golgi bodies
b) Endoplasmic reticulum
c) Lysosome
d) Mesosome

319. Chorionic villi and uterine tissue become interdigiated with each other and jointly form
a) Trophoblast b) Inner cell mass c) Placenta d) Implantation

320. Menstruation is due to sudden
a) Reduction of FSH b) Increase of LH
c) Reduction in oestrogen and progesterone d) None of the above

321. Anti-fertilizin is present on
a) Egg b) Tail c) Ovum d) Spermatozoa

322. During early and middle fetal life, the testis are located in the
a) Inguinal canal b) Abdominal cavity c) Pelvic cavity d) Scrotal saes

323. Human egg is
a) Alecithal b) Centrolecithal c) Telolecithal d) Megagalecithal

324. Cleavage forms 2-4-6-8-16 cells. These cells are called
a) Blastocysts b) Blastomeres c) Morula d) Trophoblast

325. In frog , chromosome number is reduced to half
a) When 2nd polar body is separated b) When 2nd polar body is divided
c) When 3rd polar body is separated d) When 1st polar body is separated

326. Testicular lobules contains
a) 3-5 seminiferous tubules b) 2-6 seminiferous tubules
c) 5-7 seminiferous tubules d) 1-3 seminiferous tubules

327. Lowest regeneration power is found in
a) *Amoeba* b) Sponges c) Coelenterates d) Brain cells

328. Which of the following is a mechanical barrier used in birth control?
a) Tubectomy b) Dalcon shield c) Vasectomy d) Diaphragm

329. Amphimixis is
a) Fusion of sperm with egg b) Fusion of pronucleus of sperm with egg
c) No fusion d) Fusion of diploid cells

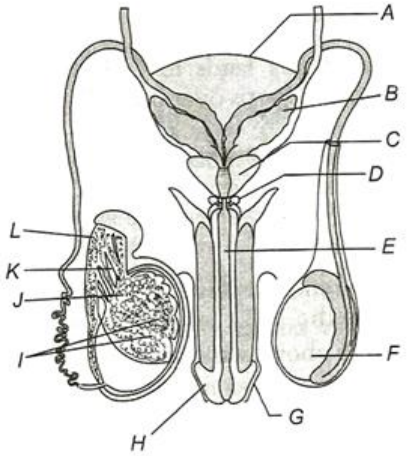
330. Our all bones are derived from the mesoderm. Except
a) Facial b) Femur c) Redula d) Occipital

331. Layers of an ovum from outside to inside is
a) Corona radiate, zonapellucida and vitelline membrane b) Zona pellucida, Corona radiate, and vitelline membrane
c) vitelline membrane, zona pellucida, and Corona radiate d) Zona pellucida, vitelline membrane, and Corona radiate

332. A human female has the maximum number of primary oocytes in her ovaries
a) At birth b) Just prior to puberty
c) Early in her fertile years d) Midway through her fertile years
333. Onset of menstruation of human female is called
a) Menopause b) Puberty c) Gestation d) Menarche
334. Ovulation takes place in a month between
a) 11-14 days b) 14-16 days c) 15-28 days d) 21-26 days
335. The best definition of the process of gastrulation is that it is a process where the
a) Single layered blastula become two layered b) Archenteron is formed
c) Zygote gets converted into larva d) Cells move to occupy their definite position
336. A boy who has not passed through puberty sustains an injury to his anterior pituitary such that FSH is no longer released, but LH secretion is normal. After he grows to maturity, one would expect that he would
a) Develop secondary sex characters
b) Be sterile
c) Have improper functioning of the testicular interstitial cells
d) Both (a) and (b)
337. Which of the following is not a case of epimorphosis?
a) Formation of sperms from small clumps of cells b) Regeneration of tail in a lizard
c) Replacement of several arm in starfish d) Replacement of limb in salamander
338. Androgen stimulates the …A… FSH acts on the …B… and stimulates factors for spermiogenesis. Here A and B refers to
a) A-Sertoli cell; B-Leydig cell
b) A-Spermatogenesis; B-Spermatid
c) A-Spermatogenesis; B-Sertoli cell
d) A- Spermatogenesis; B-Leydig cell
339. Which of the following is the group of external genitalia in human female?
a) Labium minora, labium majora, vagina
b) Labium minora, labium majora, clitoris
c) Labium minora, labium majora, oviduct
d) Labium minora, labium majora, cervix
340. Cushion of fatty tissue covered by skin and pubic hair is called
a) Mono pubis b) Labia majora c) Labia minora d) Clitoris
341. A. The mature follicle is called Graafian follicle
B. The mature follicle is called secondary follicle
a) Statement A is correct, statement B is incorrect
b) Statement B is correct, statement A is incorrect
c) Both statement are incorrect
d) Both statement are correct
342. After one month of pregnancy, the embryo's …A…. is formed. By the end of the …..B… month of pregnancy, the foetus develops limbs and digits. By the end of …C… most of the major organ systems are formed for example, the limbs and external genital organs are well-developed. By the end of …D….. the body is covered with fine hair, eyelids separate, and eyelashes are formed
Here A and D refers to
a) A-heart, B-second, C-first trimester, D-second trimester
b) A-heart, B-second, C-first month, D-second month
c) A-heart, B-second, C-first week, D-second week
d) A-heart, B-fourth, C-first trimester, D-second trimester
343. Find out the correct statement.
a) Amnion is the outer layer containing amniotic fluid that acts as shock absorber to the soft embryo
b) Yolk sac is foetal membrane that helps in the nourishment of the embryo in general

c) In mammals, allantois is not excretory in function
d) Chorio-allantoic membrane davelops villi and contribute much to the development of placenta

344. Identify A, B, C and D in the given diagram



a) A-Urinary bladder, B-Bulbourethral gland, C-Prostate gland, D-Seminal vesicles
b) A-Urinary bladder, B-Seminal vesicles, C-Prostate gland, D- Bulbourethral gland
c) A- Prostate gland, B- Seminal vesicles, C- Urinary bladder, D- Bulbourethral gland
d) A- Bulbourethral gland, B- Urinary bladder, C- Seminal vesicles, D- Prostate gland

345. Which is formed in gastrulation?
a) Archenteron b) Heart c) Brain d) None of these

346. Everytime copulation do not lead to fertilization and pregnancy because of failure of sperm to reach the
a) Ampulla b) Cervix c) Endometrium d) Myometrium

347. 64 celled stage of embryo is called
a) Blastocyst b) Blastomere c) Morula d) Inner mass of cell

348. Uterus is also called
a) Cervical canal b) Womb c) Oviduct d) Ampulla

349. Oral contraceptives are prescribed in females to check
a) Entry of sperms in vagina b) Implantation
c) Ovulation d) Fertilization

350. Which of the correct example of the type of regeneration out of the two major types?
a) Morphallaxis–regeneration of two transversely cut equal pieces of one *Hydra* into two small *Hydras*
b) Epimorphosis –replacement of old and dead erythrocytes by the now ones
c) Morphallaxis-healing of wound in the skin
d) Epimorphosis-regeneration of crushed and filtered out pieces of *Planaria* into as many new *planarian*

351. Trophoblast gives ….. to embryo
a) Nourishment b) Development c) Extra cells d) Movements

352. Fleshy folds of tissue which extends down the mons pubis and surrounds the vaginal opening is called
a) Labia minora b) Labia majora c) Hymen d) Clitoris

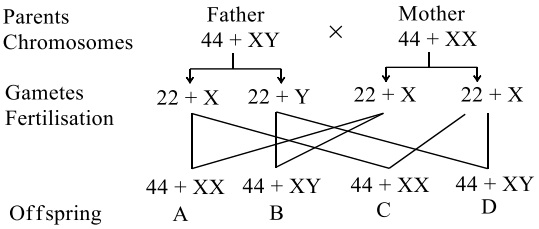
353. The embryo at 16-celled stage is known as
a) Morula b) Gastrula c) Blastula d) Blastomere

354. Non –participation of male pronucleus in fertilization is
a) Androgenesis b) Polyandry c) Gynogenesis d) Polygyny

355. Ovulation in the human female normally takes place during the menstrual cycle
a) At the mid secretory phase b) Just before the end of the secretory phase
c) At the beginning of the proliferative phase d) At the end of the proliferative phase

356. Releasing of sperms from seminiferous tubules is called
a) Spermiogenesis b) Spermiation c) Spermatogenesis d) Spermatid

357. Identify the sex of baby A, B, C, D



a) A-Girl, B-Boy, C-Girl, D-Boy
b) A- Boy, B- Girl, C- Boy, D- Girl
c) A- Boy, B-Boy, C-Girl, D- Girl
d) A-Girl, B- Girl, C- Boy, D-Boy

358. The testes in humans are situated outside the abdominal cavity inside a pouch called scrotum. The purpose served is for
a) Escaping any possible compression by the visceral organs
b) Providing more space for the growth of epididymis
c) Providing a secondary sexual feature for exhibiting the male sex
d) Maintaining the scrotal temperature lower than the internal body temperature

359. Which is present in male rabbit but not present in female rabbit?
a) Urethra
b) Vagina
c) Uterus
d) Vas deferens

360. The tertiary follicle changes into mature follicle called …A… The secondary oocyte form a new membrane called …B… surrounding it. The Graafian follicle reptures to release the secondary oocyte ovum from the ovary by the process called …C…
A, B and C in the above passage refers to
a) A-Graafian follicle; B-primary follicle; C-ovulation
b) A- ovulation; B-primary follicle; C- Graafian follicle
c) A- ovulation; B-primary follicle; C- secondary follicle
d) A-Graafian follicle; B-zona pellucida; C-ovulation

361. …… is composed of endoderm inside and splanchoropleuric extraembryonic mesoderm outside. This part is non-functional except it is the site of early blood formation. The most suitable word for the blank space is
a) Allantois
b) Chorion
c) Aminion
d) Yolk sac

362. The new membrane formed by follicular cells is called
a) Zona granulosa
b) Zona pellucida
c) Plasma membrane
d) Tertiary membrane

363. Arrange the events of menstrual cycle as they occur
I. Secretion of FSH
II. Growth of corpus luteum
III. Growth of follicle and oogenesis
IV. Ovulation
V. Sudden increase in level of LH
a) I, III, V, IV, II
b) II, I, III, IV, V
c) III, I, IV, V, II
d) I, IV, III, V, II

364. Arrhenotoky is also called
a) Diploid parthenogenesis
b) Haploid parthenogenesis
c) Incomplete parthenogenesis
d) Complete parthenogenesis

365. Vasa deferentia together with seminal vesicle forms
a) Caput epididymis
b) Corpus epididymis
c) Ejaculatory duct
d) Cauda epididymis

366. Which one of the following cells have haploid number of chromosome?
a) 1° spermatocytes
b) 2° spermatocytes
c) Spermatid
d) Both (b) and (c)

367. Acrosome present at the tip of sperm is made up of
a) Golgi bodies
b) Mitochondria
c) Lysosome
d) Ribosome

368. Sertoli cells are found in

a) Heart
b) Liver
c) Germinal epithelium
d) Seminiferous tubules

369. Gametogenesis is the formation of
a) Gametes
b) Ova
c) Sperm
d) Organs

370. Liver and pancreas are derivatives of
a) Ectoderm
b) Endoderm
c) Ectoderm and mesoderm
d) Both (a) and (b)

371. Which of the following is correct?
a) Mesoderm – Brain
b) Ectoderm –Liver
c) Mesoderm – Skeleton
d) Endodermis -Epidermis

372. Corpus luteum secretes
a) LH
b) Progesterone
c) Oestrogen
d) FSH

373. Interstitial cells are also called
a) Leydig cells
b) Rete testis
c) Vasa efferentia
d) Spermatocytes

374. Why menstrual cycle do not takes place regulary?
a) High level of hormone in blood
b) Fertilization of ovum
c) Early release of ovum
d) Psychological region

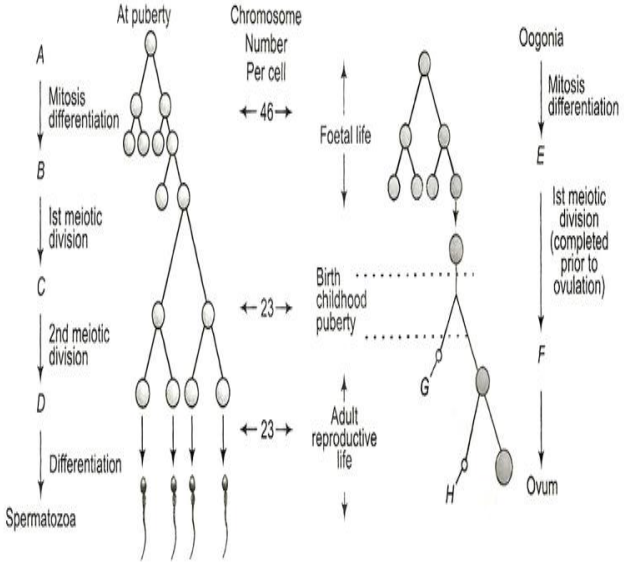
375. Which of the following is a role of Sertoli cells in spermatogenesis?
a) They provide nutrition to the developing sperms
b) They stimulate germinal epithelium
c) They direct morphogenesis of sperm
d) They provide nutrition to developing sperm; they direct morphogenesis of sperm

376. Development of animal embryo from egg without fertilization is called
a) Parthenogenesis
b) Parthenocarpy
c) Apospory
d) Apomixis

377. Cleavage is the rapid mitotic division. It occurs in
a) Gametes
b) Zygote
c) Sperm
d) Ova

378. Which one of the following statements about human sperm is correct?
a) Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilization
b) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilization
c) Acrosome serves as a sensory structure leading the sperm towards the ovum
d) Acrosome serves no particular function

379. Given diagram refers to spermatogenesis and oogenesis in humans. Identify *A* to *H* correctly.



a) A-Spermatogonia, B-Secondary spermatocytes, C-Primary spermatocytes, D-Spermatids, E-Primary oocyte, F-Secondary oocyte, G-First polar body, H-Second polar body

b) A-Spermatogonia, B- Primary spermatocytes, C- Secondary spermatocytes, D-Spermatids, E- Secondary oocyte, F-Secondary oocyte, G-First polar body, H-Second polar body
c) A-Spermatogonia, B-Primary spermatocytes, C-Secondary spermatocytes, D-Spermatids, E-Primary oocyte, F-Secondary oocyte, G-First polar body, H-Second polar body
d) A-Spermatogonia, B-Primary spermatocytes, C-Secondary spermatocytes, D-Spermatids, E-Primary oocyte, F-Secondary oocyte, G- Second polar body, H-First polar body

380. Which of them is not a correct match?
a) Proliferative phase-Rapid regeneration of myometrium and maturation of Graafian follicle
b) Secretory phase-Development of corpus luteum and increased secretion of progesterone
c) Menstruation-Breakdown of myometrium and ovum is not fertilized
d) Ovulation-LH and FSH attain last peak and sharp full in secretion of progesterone

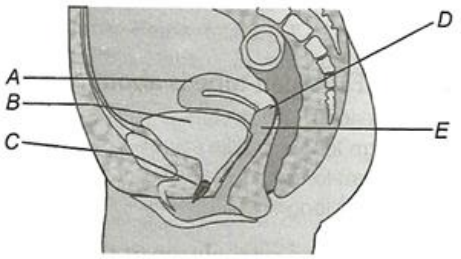
381. Origin of nervous system occurs from
a) Meso-endoderm b) Mesoderm c) Endoderm d) Ecroderm

382. The edges of infundibulum possess finger-like projection called …A… which helps in the collection of ovum. The infundibulum leads to wider part of the oviduct called …B… . Last part of oviduct, …C…. has narrow lumen and joins to uterus.
A, B and C in the above statement refers to
a) A-fimbriae; B-ampulla; C-isthmus
b) A-fimbriae; B-isthmus; C-ampulla
c) A- isthmus; B- fimbriae; C-ampulla
d) A- isthmus; B- ampulla; C- fimbriae

383. Bidder's canal is found in
a) Testis of frog b) Kidney of frog c) Kidney of mammal d) Ovary of mammal

384. Baby moving vigorously, responds to the touch and lound noises, swallowing amniotic fluid and urinating during …… of development
a) 20 weeks b) 24 weeks c) 26 weeks d) 28 weeks

385. The following diagram refers to female reproductive system of human. Identify *A* to *E*



a) A-Urethra, B-Urinary bladder, C-Uterus, D-Cervix, E-Vagina
b) A-Urethra, B-Urinary bladder, C-Uterus, D- Vagina, E- Cervix
c) A-Urethra, B-Urinary bladder, C-Uterus, D-Cervix, E-Vagina
d) A- Uterus, B-Urinary bladder, C- Urethra, D-Cervix, E-Vagina

386. Mammalian egg has
a) No yolk at all
b) Small amount of yolk
c) Large amount of yolk
d) Yolk concentrated at one pole

387. If a germ cell in a female gonad and a germ cell in a male gonad begin undergoing meiosis simultaneously, what will be the ratio of ova and sperm produced?
a) 1:1 b) 1:2 c) 1:4 d) 2:1

388. The granules present beneath the plasma membrane of oocyte cells are called …A… These granules fuses with the plasma membrane of oocyte and releases their content including …B… between the …C… and zona pellucida. This ensures the …D… . Here A, B, C and D refers to
a) A-monospermy, B-plasma membrane, C-corticle enzyme, D-corticle granules
b) A- corticle granule, B- corticle enzyme, C- plasma membrane, D- monospermy
c) A- corticle enzyme, B- corticle granules, C- plasma membrane, D- monospermy
d) A- corticle enzyme, B- corticle granules, C- monospermy, D- plasma membrane

389. What do you mean by the term spermateleosis?

a) Conversion of spermatids to sperm
b) Conversion of spermatogonium to spermatid
c) Conversion of spermatid to spermatogonium
d) Conversion of primary spermatocyte to secondary spermatocyte

390. Regeneration of tail in lizards is an example of
a) Epimorphosis b) Morphollaxis c) Heteromorphosis d) parthenogenesis

391. Which area experiences the greatest change during the menstrual cycle?
a) Vagina b) Perimetruim c) Cervix d) Endometrium

392. In humans, at the end of the first meiotic division, the male germ cells differentiate into the
a) Primary spermatocytes b) Secondary spermatocytes
c) Spermatids d) Spermatogonia

393. A Change in the amount of yolk and its distribution in the egg will affect
a) Formation of zygote
b) Pattern of cleavage
c) Number of blastomeres produced
d) Fertilization

394. Which one of the following is the correct matching of the events occurring during menstrual cycle?
a) Ovulation – LH and FSH attain peak level and sharp fall in the secretion of progesterone
b) Proliferative phase – Rapid regeneration of myometrium and maturation of Graafian follicle
c) Development of corpus luteum – Secretory phase and increased secretion of progesterone
d) Menstruation – Breakdown of myometrium and ovum not fertilized

395. 'XX' is a thick structure of male reproductive system which arises from cauda epididymis. 'XX' are 2 in number and its lining has many stereocilia. Identify 'XX'
a) Vasa efferentia b) Vasa deferentia c) Penis d) Scrotum

396. The largest component of the uterus by weight is the
a) Broad ligament b) Myometrium c) Round ligament d) Endometrium

397. Head region of the sperm contains
a) Nucleus and acrosome b) Middle piece and neck region
c) Nucleus and tail d) Middle piece and nucleus

398. The embryonic membrane involved in the formation of placenta in human is
a) Yolk sac b) Allantois c) Amnion d) Chorion

399. Hormone, which is responsible for contraction of uterus is
a) Vasopressin b) Oxytocin c) Thyrotropin d) Gonadotropin

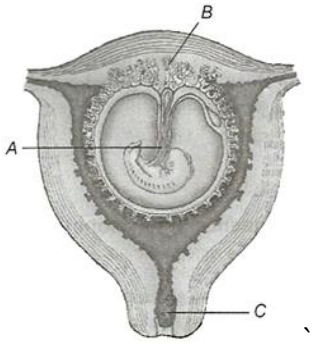
400. Labium majora of a female mammal is homologous to
a) Penis b) Prostate gland c) Epididymis d) Scrotal sac

401. Spermiogenesis or spermatiliosis is
a) Changing of spermatid to spermatozoa
b) Changing of spermatid to sperm
c) Both (a) and (b)
d) Changing of spermatid to secondary spermatocytes

402. Which extra-embryonic membrane in humans prevents desiccation of the embryo inside the uterus?
a) Chorion b) Allantois c) Yolk sac d) Amnion

403. Give the name *A*, *B* and *C* in the previous question
a) A-Secondary spermatocytes, B-Primary spermatocytes, C-Spermatozoa
b) A- Spermatozoa, B-spermatocytes, C- Primary spermatocytes, Secondary spermatocytes
c) A- Primary spermatocytes, B- Secondary spermatocytes, C-Spermatozoa
d) A- Spermatozoa, B-Secondary spermatocytes, C- Primary spermatocytes

404. In the given diagram find out, *A*, *B* and *C*



a) A-Plug of mucous in cervix, B-Placement villi, C-Umbilical cord
b) A-Umbilical cord, B-Placement villi, C- Plug of mucous in cervix
c) A-Umbilical cord, B- Plug of mucous in cervix, C-Placement villi
d) A-Placement villi, B- Plug of mucous in cervix, C-Umbilical cord

405. The type of connective tissue that is associated with the umbilical cord is
a) Areolar connective tissue
b) Jelly-like connective tissue
c) adipose connective tissue
d) Reticular connective tissue

406. The uterus opens into the vagina by a canal called
a) Cervical canal b) Fundus c) Ampulla d) Oviducts

407. Within the female ovary, primordial follicles start to develop
a) At puberty
b) Around age 5
c) At birth
d) During prenatal development

408. Binding of sperm to secondary oocyte cause …A… which ensures ….B… . The words suitable to fill the blanks are
a) A-polyspermy; B-polarisation
b) A-polarisation; B-polyspermy
c) A-depolarisaton; B-monospermy
d) A- monospermy; B- depolarisation

409. The correct sequence of spermatogenetic stages leading to the formation of sperms in a mature human testis is
a) Spermatocyte-spermatogonia-spermatid-sperm
b) Spermatogonia - Spermatocyte-spermatid-sperm
c) Spermatid - Spermatocyte-spermatogonia- sperm
d) spermatogonia-spermatid- Spermatocyte- sperm

410. Mixing up of chromosome of male and female nucleus is called
a) Karyogamy b) Amphimixis c) Both (a) or (b) d) None of the above

411. Body covered with fine hair, eyelid separates and eye lashes are formed during ….. of development
a) 3rd month b) 4th month c) 5th month d) 6th month

412. Which of the following hormones does not play any role is menstruation?
a) GH b) FSH c) LH d) None of these

413. Withdrawl of which hormone cause desintegration of corpus luteum?
a) Progesterone b) LH c) Both (a) and (b) d) None of these

414. Hormone …A… secretes by the anterior lobe of pituitary, which stimulates the ovarian follicle and follicle secrets the …B… hormone. Here A and B refers to
a) A-FSH; B-progesterone
b) A-FSH; B-inhibin
c) A-Inhibin; B-FSH
d) A-FSH; B-oestrogen

415. Egg secrets a chemical called …A… which is made up of …B… and sperm secretes a chemical called …C… made up of …D… The adhesion of sperm to the egg of same species through chemical recognition is called …E… . Here A to E refers to
a) A-fertilisin, B-glycoprotein, C-antifertilisin, D-protein, E-agglutination
b) A-fertilisin, B-glucose, C-antifertilisin, D- glucose, E-agglutination
c) A-fertilisin, B-fructose, C-antifertilisin, D- fructose, E-agglutination
d) A-fertilisin, B- protein, C-antifertilisin, D- glycoprotein, E-agglutination

416. The clitoris in females is
a) Analogous to penis
b) Homologous to penis
c) Functional penis in female
d) Non-functional penis in male

417. Facial bones in humans are derived from
a) Ectoderm
b) Endoderm
c) Mesoderm
d) Trophoblast cells

418. Regeneration of liver is
a) Metamorphosis
b) Reparative regeneration
c) Epimorphosis
d) Morphogenesis

419. Embryologist can draw the fate maps of future organ of embryo in
a) Blastula
b) Morula
c) Early gastrula
d) Late gastrula

420. Pseudocoelom developed from
a) Embryonic mesoderm
b) Archenteron
c) Blastocoel
d) Blastopore lip

421. In human beings, normally in which one of the following parts, does the sperm fertilize the ovum?
a) Cervix
b) Fallopian tube
c) lower part of uterus
d) Upper part of uterus

422. Function of bulbourethral gland is to
a) Lubricate the penis
b) Increase the motility of sperm
c) Enhance the sperm count
d) All of the above

423. Fluid filled cavity called …A… is present in …B… follicle called …C…. Here A, B and C are
a) A-secondary follicle, B-primary follicle, C-tertiary follicle
b) A- primary follicle, B-antrum, C- secondary follicle
c) A- tertiary follicle, B- secondary follicle, C- antrum
d) A- antrum, B- secondary follicle, C-tertiary follicle

424. Spermatids are transformed into spermatozoa by
a) Spermiation
b) Spermatogenesis
c) Meiosis
d) spermiogenesis

425. Length and width of testis is
a) 4-5 cm and 2-3 cm
b) 5-6 cm and 3-4 cm
c) 6-7 cm and 4-5 cm
d) 7-8 cm and 8-9 cm

426. Which cell organelle is absent in human sperm?
a) ER
b) Mitochondria
c) Nucleus
d) Centrioles

427. Largest egg is of
a) PPLO
b) Ostrich
c) Hydra
d) *Periplaneta Americana*

428. The endometrium is the lining of
a) Bladder
b) Vagina
c) Uterus
d) Oviduct

429. Acrosome is a type of
a) Lysosome
b) Flagellum
c) Ribosome
d) Basal body

430. Which gland in female is a counterpart of Cowper's gland in male?
a) Bartholin's gland
b) Clitoris
c) Perineal gland
d) None of these

431. Embryo at 8 to 16 cell stage is called
a) Blastula
b) Morula
c) Trophoblast
d) All of these

432. Neoteny refers to
a) Development of gonads
b) Pre-adult animal
c) Metamorphosis
d) Retention of larval or embryonic trait in the adult body

433. Implantation is
a) Attachment of blastocyst to uterine wall
b) Division of blastocyst
c) Formation of organs
d) An IVF technique

434. When released from ovary, human egg contains
a) One Y-chromosome
b) Two X-chromosomes
c) One X-chromosome
d) XY-chromosomes

435. Acrosome is a part of
a) Foetus
b) Graafian follicle
c) Human ovum
d) Human sperm

436. Eunuchoidism is due to the failure of production of
a) FSH
b) Testosterone
c) ICSH
d) Oestrogen

437. Which part of the sperm contains hydrolytic enzymes?
a) Head region
b) Neck region
c) Cap region
d) Tail region

438. Which of the following takes part in the formation of placenta?
a) Only trophoblast
b) Only allantois
c) Trophoblast and mesoderm
d) Both (b) and (c)

439. Which one of the following statements about morula in humans is correct
a) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
b) It has far less cytoplasm as well as lessDNA than in an uncleaved zygote
c) It has more or less equal quantity of cytoplasm and DNA as in uncleaved zygote
d) It has more cytoplasm and more DNA than an uncleaved zygote

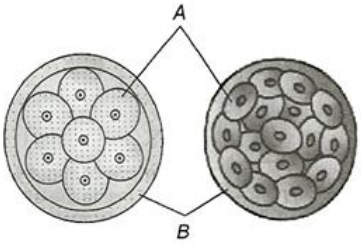
440. Embryonic period is also called
a) Prenatal period
b) Development period
c) Postnatal period
d) None of the above

441. Function of scrotum is to maintain the
a) Temperature of testis
b) Body temperature
c) Level of growth hormone
d) Level of male hormone

442. Sperm enters from which part of egg?
a) Anywhere in fertilized egg from animal pole
b) From animal pole in unfertilized egg
c) In unfertilized egg from vegetal pole
d) None of the above

443. Which of the following hormones is secreted by implanted blastocyst, that acts on the corpus luteum in the ovary, stimulating the body to produce oestrogens and progesterone to maintain the uterine lining?
a) Oestrogen
b) HCG
c) Progesterone
d) Oxytocin

444. Find A and B in the figure



a) A-Blastocyst; B-Blastomere
b) A-Blastula; B-Plasma membrane
c) A-Blastomere; B-Zona pellucida
d) A-Zona pellucids; B-Blastomere

445. Which of the following organs is devoid of glands?
a) Uterus
b) Vagins
c) Vulva
d) Oviduct

446. Match the following cell types with the corresponding chromosome complement, that is, whether the cell is haploid or diploid? (*Note* If the cell is haploid use 'A', if diploid use 'B')
I. Spermatozoan
II. Secondary spermatocyte
III. Spermatogonium
IV. Spermatid
V. Primary spermatocyte
VI. Secondary oocyte
VII. Second polar body
VIII. First polar body

IX. Primary oocyte

a) I-A, II-A, III-B, IV-A, V-B, VI-A, VII-A, VIII-A, IX-B
b) I-A, II-A, III-B, IV-B, V-B, VI-A, VII-A, VIII-A, IX-A
c) I-A, II-A, III-A, IV-A, V-A, VI-A, VII-A, VIII-B, IX-B
d) I-B, II-B, III-B, IV-B, V-B, VI-B, VII-B, VIII-A, IX-B

447. Which part of the sperm assist first mitotic division?

a) Acrosome b) Neck c) Middle part d) Tail part

448. Sperm entry takes place in the secondary oocyte by

a) Cone of rejection
b) Cone of reception
c) Fertilisation cone
d) Both (b) and (c)

449. Sperm lysin is found in

a) Neck region of sperm b) Middle region of sperm
c) Head region of sperm d) Tail region of sperm

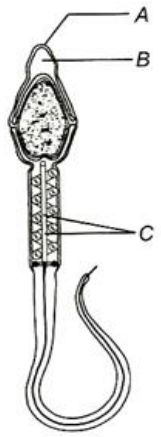
450. Compartments in mammalian testes are called

a) Testicular lobules b) Seminiferous tubules
c) Sertoli cells d) Interstitial cells

451. Human Fallopian tube is about

a) 8-9 cm long b) 9-10 cm long c) 10-12 cm long d) 12-17 cm long

452. Identify *A*, *B* and *C* in the given human sperm diagram



a) A-Acrosome, B-Plasma membrane, C-Mitochondria
b) A- Plasma membrane, B- Acrosome, C-Mitochondria
c) A- Mitochondria, B- Acrosome, C- Plasma membrane
d) A- Mitochondria, B-Plasma membrane, C- Acrosome

453. Prostate gland surrounds the …A… . It produces milky, slightly alkaline solution which forms …B… volume of the semen. The secretion contains …C… acid; enzymes (acid phosphates, amylase pepsinogen and prostaglandins).

A, B and C in the above statement is

a) A-prostate gland, B-35%, C-carboxylic b) A-penis, B-40%, C-carboxylic
c) A-ureter, B-25%, C-citric d) A-ureter, B-50%, C-citric

454. Corpus luteum produces

a) Progesterone b) Oestrogen c) Luteotropin hormone d) Luteinzing hormone

455. In gastrulation, which of the forewing germ layer is /are formed?

a) Endoderm b) Mesoderm c) Ectoderm, endoderm d) All of the above

456. The permissible use of the technique amniocentesis is for

a) Detecting sex of the unborn foetus
b) Artificial insemination
c) Transfer of embryo into the uterus of a surrogate mother

d) Detecting any genetic abnormality

457. Identify the correctly matched pairs of the germ layers and their derivatives.
I.Ectoderm – Epidermis
II.Endoderm – Dermis
III.Mesoderm – Muscles
IV.Mesoderm – Notochord
V.Endoderm – Enamel of teeth
a) I, III and IV only b) I, II, III and V only c) I and IV only d) I and II only

458. Follicular phase lasts for
a) 6-13 days b) 6-24 days c) 6-10 days d) 6-8 days

459. Fertilization of ovum by the sperm takes place in
a) Ampulla of oviduct b) Isthmus of oviduct c) Fimbriae of oviduct d) None of the above

460. Bartholin glands are situated
a) On the sides of head
b) At the reduced tail end of birds
c) On either sides of vas deferens in human
d) On either sides of vagina in human

461. The organ which produces gametes are called …A… and which neither produces gametes nor hormones are called …B… . Here A and B represent
a) A-primary sex organs; B-secondary sex organs
b) A- secondary sex organs; B- primary sex organs
c) A-tertiary sex organs; B-secondary sex organs
d) A- secondary sex organs; B- tertiary sex organs

462. Sertoli's cells are found in
a) Pancreas b) Testes c) ovary d) Livery

463. In males LH is called
a) Androgen binding protein b) Inhibin
c) ICSH (Interstitial Cell Stimulating Hormones) d) FSH

464. Sertoli's cells found in testis. These cells are
a) Nurse cells b) Reproductive cells c) Receptor cells d) None of the above

465. Mainly which type of hormones control the menstrual cycle in human beings?
a) FSH b) LH c) FSH, LH, Oestrogen d) Progesterone

466. Parturition is the process of
a) Child birth b) Fusion of gametes
c) Both (a) and (b) d) Releasing of gametes

467. Placenta is a connection between
a) Foetus and vaginal wall b) Foetus and Fallopian tube
c) Foetus and uterine wall d) Embryo and scrotum

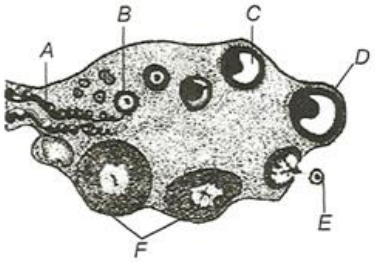
468. The hormone that prepares and maintains the uterus during pregnancy is secreted by
a) Corpora cardiaca b) Corpus luteum c) Corpora albicans d) Graafian follicle

469. The early stage human embryo distinctly possesses
a) Gills b) Gil slits c) External ear (pinna) d) Eyebrows

470. In human lining of gastrointestinal tract, lining of lungs, thymus thyroid, tonsils, kidney duct and bladder are derived from
a) Ectoderm b) Mesoderm c) Endoderm d) Both (b) and (c)

471. Which of these is used to control human population?
a) Oestrogen and progesterone b) IUCD and MTP
c) Tubectomy and vasectomy d) All of the above

472. Give the name of C and D in the diagram



a) Secondary spermatocyte and primary spermatocytes
b) Spermatid and ootid
c) Primary spermatocyte and secondary spermatocytes
d) All of the above

473. The first menstruration begins at puberty is called
a) Menopause b) Ovulation c) Gametogenesis d) Menarch

474. An antrum is the characteristic of ….follicles
a) Secondary
b) Graafian
c) Primary
d) Secondary or Graafian

475. The blastomeres in the blastocyst are arranged into an outer layer called ……. and an inner group of cells attached to trophoblast called the …….. mass.
The trophoblast layer gets attached to the …… and the ……. differentiated as the embryo. As a result the …….. becomes embeded in the endometrium of the uterus. This is called ….. and it leads to pregnancy.
Blanks given in the above paragraph are filled in chronological order as
a) Inner cell, trophoblast, endometrium, inner mass cell, blastocyst, implantation
b) Trophoblast, inner cell, endometrium, inner mass cell, blastocyst, implantation
c) Trophoblast, inner cell, endometrium, inner mass cell, implantation, blastocyst
d) Trophoblast, inner cell, inner cell mass, endometrium, implantation, blastocyst

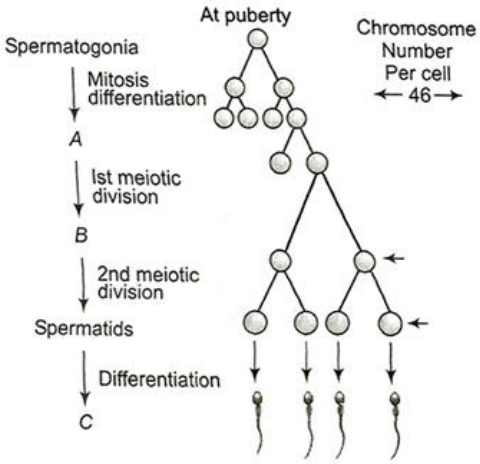
476. Inner portion of the seminiferous tubules contain
a) Male germ cell
b) Sertoli cells
c) Both (a) and (b)
d) Interstitial or leydig cell

477. The epididymis leads to …A… that ascends to abdomen and loops over the …B…. Here A and B refers to
a) A-epididymis; B-vas deferens
b) A-vas deferens; B-epididymis
c) A-vas deferens; B-urinary bladder
d) A-urinary bladder; B-vas deferens

478. Chorion is made up of
a) Trophoblast outer and somatopleuronic inside
b) Somatopleuronic outside and trophoblastic inside
c) Both (a) and (b)
d) None of the above

479. Endocrine portion of testis is
a) Seminiferous tubules
b) Interstitial cells
c) Leydig cell
d) Both (b) and (c)

480. Find out the chromosome number in the structures A, B and C



a) 46, 23, 46
b) 23, 46, 46
c) 46, 23 ,23
d) 23, 23, 46

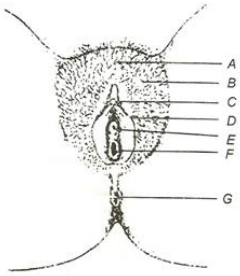
481. Genes in the somatic cells of the body undergoes mutation with the passages of time. Such mutations cause senescence. It is related with
a) Hormonal theory
b) Programmed senescence theory
c) Error and damages theories
d) Immunological theories

482. Identify *I*, *J*, *K* and *L* in the diagram of Q, 35
a) I-Rete-testis, J-Vasa efferentia, K-Epididymis, L-Testicular lobules
b) I-Vasa efferentia, J-Rete-testis, K-Testicular lobules, L-Epididymis
c) I-Epididymis, J-Vasa efferentia, K-Rete-testis, L-Testicular lobules
d) I-Testicular lobules, J-Rete-testis, K-Vasa efferentia, L-Epididymis

483. The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?
a) Fourth month
b) Fifth month
c) Sixth month
d) Third month

484. Which is immortal?
a) Plasma cell
b) Germ cell
c) Brain cell
d) Kidney cell

485. Match *A* to *G* with *I* to VII given below



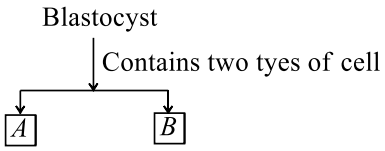
I. Anus
II. Glans (clitoris)
III. Labia majora
IV Labia manora
V. Mons pubis
VI. Urethra
VII. Vagina

a) A-V, B-IV, C-III, D-II, E-VI, F-VII, G-I
b) A-V, B-III, C-II, D-IV, E-VI, F-VII, G-I
c) A-II, B-III, C-V, D-IV, E-VI, F-VII, G-I
d) A-V, B-VI, C-VII, D-IV, E-II, F-III, G-I

486. How many sperm cells are present in an average (3cc) ejaculation?
a) 200 million
b) 300 million
c) 400 million
d) 500 million

487. First milk produced after child birth is called
a) Sebum
b) Cerumen
c) True milk
d) Colostrum

488. Sperm's acrosome has
a) Hyaluronic acid and proacrosin
b) Hyaluronic acid and Fertilizin
c) Hyaluronidase and proacrosin
d) Fertilizin and proacrosin

489.


a) A-Trophoblast; B-Inner mass of cell
b) A-Trophoderm; B-Embroyblast
c) Either (a) or (b)
d) Both (a) and (b)

490. Ageing is retarded by
a) ABA
b) CKN
c) GA
d) C_2H_4

491. The colour of bone marrow in foetus is
a) Red
b) Yellow
c) Brown
d) None of these

492. In rabbit, head of epididymis present at the head of the testis is called
a) Vas deferens
b) Cauda epididymis
c) Gubernaculum
d) Caput epididymis

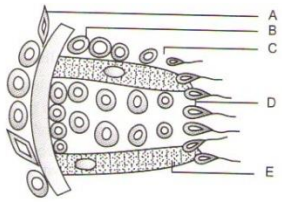
493. The main tissue present in breast is ……. tissue
a) Glandular
b) Sequamous
c) Ciliated
d) Epithelium

494. Placenta faciliate
a) Supply of oxygen
b) Nutrient supply
c) Removal of excretory material
d) All of the above

495. Which of the following undergoes spermiogenesis?
a) Spermatids
b) Spermatogonia
c) Primary spermatocytes
d) Secondary spermatocytes

496. Cleavage found in mesolecithal egg is
a) Holoblastic and equal
b) Holoblastic and unequal
c) Meroblastic
d) Discoidal

497. Choose the correct combination of labeling of seminiferous tubules of testis.



a) A - Sertoli's cells B - Spermatogonium C - Spermatid D – Interstitial cell E - Spermatozoa
b) A - Interstitial cell B - Spermatid C - Spermatogonium D – Spermatozoa E - Sertoli's cells
c) A - Interstitial cell B - Spermatid C - Spermatozoa D – Spermatogonium E - Sertoli's cells
d) A - Interstitial cell B - Spermatogonium C - Spermatid D – Spermatozoa E - Sertoli's cells

498. In human, the unpaired male reproductive structure is
a) Seminal vesicle
b) Prostate
c) Bulbourethral gland
d) Testes

499. The main function of the fimbriae of the fallopian tube in females is to
a) Release to ovum from the graafian follicle
b) Make necessary changes in the endometrium for implantation
c) Help in the development of corpus luteum
d) Help in the collection of the ovum after ovulation

500. Name the parts and organelles of the sperms which are important in zygotes first cleavage, after syngamy
a) Neck and mitochondria
b) Neck and tail
c) Neck and centriole
d) Neck and head

501. The signals for parturition originates from the fully developed foetus and followed by placenta causing the mild contractions called

a) Foetal ejection reflex
b) Embryo ejection reflex
c) Blastocoel ejaculation reflex
d) Still birth

502. Find out corpus luteum and ovum in the previous question figure
a) A and B
b) B and C
c) C and D
d) F and E

503. Corpus luteum is developed from
a) Oocyte
b) Nephrostome
c) Graafian follicle
d) None of these

504. Milk secretion in mammals is associated with
a) Vasopressin
b) Progesterone
c) Prolactin
d) Oxytocin

505. Which layer develops first during embryonic development?
a) Ectoderm
b) Mesoderm
c) Endoderm
d) Both (b) and (c)

506. The reproductive cycle in the female primate monkeys, apes and human beings is called
a) Menstrual cycle
b) Menarche
c) Menopause
d) ovulation

507. Which of the following are secretions produced by the spermatozoa at the time of fertilization?
a) Fertilizin and anti-fertilizin
b) Anti-fertilizin and sperm lysin
c) Fertilizin and sperm lysin
d) Only sperm lysin

508. Males have numbers of internal accessory organs. Which one (s) is/are responsible for secreting fluid containing fructose and prostaglandins?
a) Epididymis
b) Seminal vesicles
c) Vas deferens
d) Prostate gland

509. Which of the following structures is ectodermal in origin?
a) Notochord
b) Kidney
c) Brain
d) Liver

510. Tablets to prevent contraception contain
a) Progesterone
b) FSH
c) LH
d) Both (b) and (c)

511. The living organisms can be unexceptionally distinguished from the non-livings on the basis of their ability for
a) Responsiveness to touch
b) Interaction with the environment and progressive evolution
c) Reproduction
d) Growth and movement

512. Inner mass of cell or embryoblast give rise to
a) Foetal part
b) Embryo
c) Notochord
d) Nourishment cell

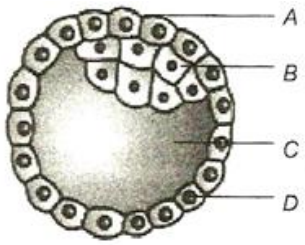
513. Most of the organs are formed during ….. of development
a) 1st month
b) 2nd month
c) 3rd month
d) 4th month

514. How many compartments (approx.) are there in each human testis?
a) 250
b) 300
c) 350
d) 400

515. The lytic enzyme present in semen is
a) Ligase
b) Oestrogenase
c) Androgenase
d) Hyaluronidase

516. In which of the following, the dead space is highest?
a) Old man
b) Old woman
c) Young man
d) Young woman

517. Find *A* to *D* in figure

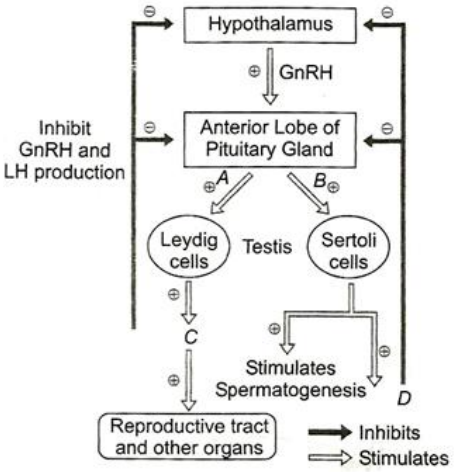


a) A-Breaking zona pellucida, B-Inner cell mass, C-Blastocoel, D-Trophoblast
b) A-Breaking zona pellucida, B-Inner cell mass, C- Trophoblast, D- Blastocoel
c) A-Breaking zona pellucida, B- Blastocoel, C-Inner cell mass, D-Trophoblast
d) A-Breaking zona pellucida, B- Trophoblast, C- Inner cell mass, D- Blastocoel

518. In menstrual cycle, the menstrual phase last for

a) 3-5 days b) 5-6 days c) 1-3 days d) 2-3 days

519. Give the name of A, B, C and D hormone in the following diagram



a) A-Inhibin, B-FSH, C-Testosterone, D-LH
b) A-Testosterone, B-Inhibin, C- LH, D-FSH
c) A-FSH, B- LH, C-Inhibin, D-Testosterone
d) A-LH, B-FSH, C-Testosterone, D-Inhibin

520. Cryptorchidism is a condition in which
a) Testis does not descend into scrotal sac b) Sperm is not found
c) Male hormones are not reactive d) Ovaries are removed

521. At which phase, both LH and FSH attain a peak level?
a) Menstrual phase b) Follicular phase c) Ovulatory phase d) Luteal phase

522. Find out the chromosome number, in A, B, C of previous question
a) 46, 23, 23 b) 46, 46, 23 c) 46, 46, 46 d) 46, 23, 46

523. Synthesis of testosterone by Leydig cells is stimulated by
a) LTH b) TSH c) FSH d) ICSH

524. Select human development stages and its place at occurrence in normal pregnant woman
a) Late morula – Middle part of Fallopian tube
b) Blastula – End part of Fallopian tube
c) Blastocyst – Uterine wall
d) 8-celled morula – Starting point of Fallopian tube

525. Region outside the seminiferous tubules is called
a) Inter digital space b) Inter space c) Interstitial space d) Blind space

526. Hormone which stimulates the 'let down' release of milk from mother's breast when the baby is suckling, is
a) Prolactin b) Progesterone c) Oxytocin d) Relaxin

527. Corpus spongiosum is found in
a) Ovary b) Penis c) Testis d) Uterine wall

528. Primary spermatocyte differs form spermatogonium in
a) Number of chromosomes b) Size and volume
c) DNA content d) Size of chromosomes

529. During ovulation all of the following occur except
a) Rupture of the Graafian follicle b) Low oestrogen production
c) High FSH and LH production d) Formation of the corpus luteum

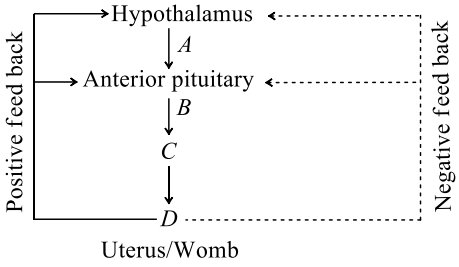
530. In human all the three germ layers are originated from
a) Trophoblast cells b) Inner cell mass
c) Both (a) and (b) d) They have special lineage

531. How many sperms are formed by four primary spermatocytes?
a) 1 b) 4 c) 16 d) 32

532. Stem cell can give rise to/the

a) Any types of cells
b) Heart cells
c) Special tissue
d) Special organs only

533. Given below is an incomplete flow chart showing influence of hormones of gametogenesis in human females. A, B, C and D in the chart refers to



a) A-GnRH, (Gonadotropin Releasing Hormone), B-Oestrogen and progesterone, C-Ovary, D-FSH and LH
b) A-GnRH, (Gonadotropin Releasing Hormone), B-Progesterone and LH, C-Ovary, D- Oestrogen and FSH
c) A-GnRH, (Gonadotropin Releasing Hormone), B-FSH and Oestrogen, C-Ovary, D-LH and Progesterone
d) A-GnRH, (Gonadotropin Releasing Hormone), B-FSH and LH, C-Ovary, D- Oestrogen and Progesterone

NEET BIOLOGY

HUMAN REPRODUCTION

: ANSWER KEY :

1)	a	2)	c	3)	d	4)	a	161)	b	162)	d	163)	c	164)	a
5)	c	6)	c	7)	d	8)	c	165)	b	166)	c	167)	c	168)	a
9)	c	10)	c	11)	a	12)	b	169)	b	170)	d	171)	b	172)	a
13)	c	14)	d	15)	b	16)	a	173)	b	174)	b	175)	a	176)	c
17)	b	18)	a	19)	b	20)	a	177)	a	178)	b	179)	c	180)	d
21)	a	22)	c	23)	c	24)	b	181)	c	182)	c	183)	d	184)	c
25)	b	26)	b	27)	a	28)	c	185)	c	186)	b	187)	b	188)	b
29)	b	30)	d	31)	b	32)	b	189)	a	190)	b	191)	c	192)	c
33)	b	34)	a	35)	a	36)	b	193)	a	194)	b	195)	c	196)	a
37)	b	38)	a	39)	b	40)	c	197)	a	198)	a	199)	c	200)	b
41)	b	42)	c	43)	c	44)	c	201)	d	202)	d	203)	d	204)	a
45)	a	46)	a	47)	b	48)	d	205)	a	206)	d	207)	c	208)	b
49)	a	50)	a	51)	c	52)	b	209)	b	210)	c	211)	c	212)	b
53)	c	54)	a	55)	a	56)	c	213)	b	214)	b	215)	d	216)	a
57)	d	58)	d	59)	a	60)	a	217)	b	218)	a	219)	a	220)	a
61)	d	62)	c	63)	c	64)	b	221)	b	222)	a	223)	c	224)	d
65)	a	66)	d	67)	a	68)	b	225)	a	226)	a	227)	a	228)	c
69)	b	70)	a	71)	c	72)	d	229)	c	230)	d	231)	d	232)	b
73)	c	74)	a	75)	c	76)	d	233)	c	234)	c	235)	b	236)	a
77)	a	78)	c	79)	c	80)	c	237)	c	238)	b	239)	c	240)	a
81)	a	82)	a	83)	a	84)	b	241)	a	242)	b	243)	c	244)	b
85)	a	86)	b	87)	a	88)	b	245)	d	246)	a	247)	a	248)	c
89)	b	90)	c	91)	c	92)	c	249)	d	250)	a	251)	b	252)	c
93)	a	94)	d	95)	b	96)	a	253)	b	254)	c	255)	d	256)	c
97)	b	98)	b	99)	d	100)	d	257)	b	258)	b	259)	a	260)	a
101)	b	102)	b	103)	b	104)	c	261)	a	262)	c	263)	a	264)	c
105)	a	106)	a	107)	c	108)	c	265)	d	266)	b	267)	b	268)	b
109)	a	110)	c	111)	d	112)	d	269)	b	270)	a	271)	a	272)	b
113)	d	114)	b	115)	a	116)	a	273)	b	274)	a	275)	a	276)	b
117)	a	118)	b	119)	a	120)	a	277)	c	278)	d	279)	a	280)	b
121)	d	122)	a	123)	a	124)	d	281)	b	282)	d	283)	b	284)	a
125)	a	126)	d	127)	d	128)	c	285)	a	286)	d	287)	a	288)	b
129)	b	130)	a	131)	a	132)	c	289)	c	290)	b	291)	c	292)	a
133)	b	134)	c	135)	c	136)	d	293)	c	294)	a	295)	a	296)	c
137)	c	138)	c	139)	a	140)	c	297)	c	298)	a	299)	a	300)	d
141)	c	142)	d	143)	a	144)	c	301)	c	302)	a	303)	b	304)	b
145)	b	146)	b	147)	a	148)	b	305)	b	306)	b	307)	d	308)	c
149)	b	150)	b	151)	b	152)	c	309)	c	310)	c	311)	a	312)	b
153)	c	154)	a	155)	a	156)	d	313)	c	314)	b	315)	c	316)	d
157)	a	158)	b	159)	a	160)	a	317)	a	318)	a	319)	c	320)	c

321)	d	322)	b	323)	a	324)	b	433)	a	434)	c	435)	d	436)	b
325)	d	326)	d	327)	d	328)	d	437)	a	438)	c	439)	d	440)	a
329)	c	330)	a	331)	a	332)	a	441)	a	442)	b	443)	b	444)	c
333)	d	334)	b	335)	b	336)	b	445)	d	446)	a	447)	b	448)	d
337)	a	338)	c	339)	b	340)	a	449)	c	450)	a	451)	c	452)	a
341)	a	342)	a	343)	a	344)	b	453)	c	454)	a	455)	d	456)	d
345)	a	346)	a	347)	a	348)	b	457)	a	458)	a	459)	a	460)	d
349)	c	350)	a	351)	a	352)	b	461)	a	462)	b	463)	c	464)	a
353)	a	354)	c	355)	d	356)	b	465)	c	466)	a	467)	c	468)	b
357)	a	358)	d	359)	d	360)	a	469)	b	470)	c	471)	d	472)	a
361)	d	362)	b	363)	a	364)	b	473)	d	474)	d	475)	b	476)	c
365)	c	366)	d	367)	a	368)	d	477)	c	478)	a	479)	d	480)	c
369)	a	370)	b	371)	c	372)	b	481)	c	482)	d	483)	b	484)	b
373)	a	374)	a	375)	d	376)	a	485)	b	486)	b	487)	d	488)	c
377)	b	378)	b	379)	c	380)	d	489)	c	490)	b	491)	a	492)	d
381)	d	382)	c	383)	b	384)	d	493)	a	494)	d	495)	a	496)	b
385)	d	386)	b	387)	c	388)	b	497)	d	498)	b	499)	d	500)	c
389)	a	390)	a	391)	d	392)	b	501)	a	502)	d	503)	c	504)	c
393)	b	394)	c	395)	b	396)	b	505)	d	506)	a	507)	b	508)	b
397)	a	398)	d	399)	a	400)	a	509)	c	510)	a	511)	c	512)	b
401)	a	402)	c	403)	c	404)	b	513)	c	514)	a	515)	d	516)	a
405)	b	406)	a	407)	d	408)	c	517)	a	518)	a	519)	d	520)	a
409)	b	410)	c	411)	d	412)	a	521)	c	522)	b	523)	d	524)	c
413)	b	414)	d	415)	a	416)	b	525)	a	526)	c	527)	b	528)	b
417)	a	418)	b	419)	a	420)	c	529)	b	530)	b	531)	b	532)	a
421)	b	422)	a	423)	d	424)	d	533)	d						
425)	a	426)	a	427)	b	428)	c								
429)	a	430)	a	431)	a	432)	d								

NEET BIOLOGY

HUMAN REPRODUCTION

: HINTS AND SOLUTIONS :

1 **(a)**

Rout of milk secretion

Mammary Tubule (T)
↓
Mammary Duct (M)
↓
Mammary Ampulla (A)
↓
Lactiferous Duct (L)

Internally, the breast consists of the glandular tissue forming mammary glands, the fibrous tissue (connective tissue) and the fatty or adipose tissue. Mammary glands are modified **sweat glands**

2 **(c)**

I. Oestrogen – D
II. Ovulation – G
III. Repair of endometrium – F
IV. Luteinising hormone – C
V. Menstruation – H
VI. Luteal phase – B
VII. Progesterone – E
VIII. Ovarian phase - A

3 **(d)**

Gastrulation is the process of the formationof gastrula from the blastula. It is characterized y formation of three primary germ layers and morphogenetic movements including epiboly, emboly, involution, invagination and delamination.

4 **(a)**

Among prostaglandin, oestrogen and oxytocin, it is oxytocin contract the uterine wall strongly.

Parturition

(i) The average duration of human pregnancy is about 9 months which is called the gestation period

(ii) The act of expelling the full term foetus from the mother's uterus at the end of gestation period is called parturition

(iii) It is induced by a complex neuroendocrine mechanism

(iv) Parturition signals originates from the fully developed foetus and the palcenta, which induce mild uterine contractions called foetus ejection reflex

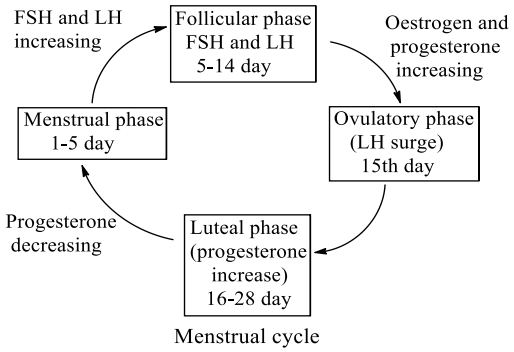
(v) This triggers the release of oxytocin from the maternal pituitary

(vi) Oxytocin induces stronger uterine muscle contractions

(vii) Relaxin increases the flexibility of the pubic symphysis and ligaments that helps to dilate the uterine cervix during labour pain

(viii) This leads to the expulsion of baby

5 **(c)**



Menstrual cycle

Generally, menstrual cycle have four phases

(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.

(b) The unfertilized egg and soft tissue are discharged.

(c) It lasts 3-5 days.

(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.

(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.

(c) It least for about 10-14 days.

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(b) It lasts for only about 48 hr.
(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation

6 **(c)**
In isolecithal eggs, yolk is uniformly distributed (*e.g.,* mammals). In centrolecithal eggs, yolk is in the centre of the egg (*e.g.,* insects). In polyleithal eggs, yolk is in patches, (*e.g.,* insects) and in telolecithal eggs, yolk is concentrated at one of the egg (*e.g.*, frog, birds). Eggs of human being are microlecithal and isolecithal.

7 **(d)**
Capacitation takes about 5-6 hours.
Capacitation of Sperm The sperms in the female is genital tract are made capable of fertilizing the egg by the secretion of female genital tract. These secretions of the female genital tract removes the coating substances deposited on the surface of the sperms, particularly those on acrosome. Thus, the receptor sites on the acrosome are exposed and sperm become active to penetrate the egg. This phenomenon of sperm activation in mammals is called capacitation. It takes about 5-6 hr for capacitation of sperm

8 **(c)**
The grey crescent area is an area just opposite to the entry of sperm into ovum.

9 **(c)**
Corpus luteum is the yellow endocrine body formed in the ovary at the site of a ruptured Graafian follicle, while macula lutea is a yellow spot on the retina. The common feature between the two is that both (corpus luteum and macula lutea) are characterized by yellow colour.

10 **(c)**
A cross section at the midpoint of the middle piece of a sperm will show mitochondria and 9+2 arrangement of microtubules.

11 **(a)**
Fusion of male and female gametes is called fertilization. It can be external (outside the female genital tract) like frog, fishes or internal (inside the female genital tract) like mammals, birds, etc.

12 **(b)**
Rapid mitosis in zygote into the blastomeres Gametes. *The major reproductive events in human beings are as follows*
(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)
(ii) **Insemination** It is the transfer of sperms by the male into the genital tract of the female
(iii) **Fertilization** Fusion of male and female gametes to form zygote is called fertilization
(iv) **Cleavage** It is rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst (blastula)
(v) **Implantation** It is the attachment of blastocyst to the uterine wall
(vi) **Placentation** It involves the formation of placenta which is the intimate connection between the foetus and uterine wall of the mother to exchange the materials
(vii) **Gastrulation** It is the process by which blastocyst is changed into gastrula with three primary germ layers
(viii) **Organogenesis** It is the formation of specific tissue, organs and organ systems from three primary germ layers
(ix) **Parturition** (child birth) it involves expelling of the baby from the mother's womb (uterus)

13 **(c)**
Generally, menstrual cycle have four phases
(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
(b) The unfertilized egg and soft tissue are discharged.
(c) It lasts 3-5 days.
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(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation.
(d) Oestrogen and progesterone levels rise during this phase. It lasts for only 1 day. (e) During pregnancy all events of the menstrual cycle stop and there is no menstruation. The menstrual cycle permanently stops in females at the age of around 50 years. This is called **menopause**

14 **(d)**
In the ovulatory phase, both LH and FSH attain a peak level in middle of cycle (about 14 day). Rapid secretion of LH induces rupturing of Graafian follicle and thereby releasing the ovum in human beings (secondary oocyte is released). This is called ovulation. Infact increase level of LH causes ovulation

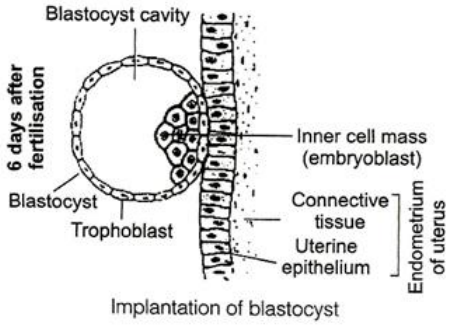
15 **(b)**
The phase of menstrual cycle in women that lasts for 7-8 days, is ovulatory phase.

16 **(a)**
Correct sequence in development is fertilisation (union of male
of male and female gamete)
↓
Zygote (syngany or amphioxis) leads to the zygote)
↓
Cleavage (series of rapid mitotic division of the zygote)
↓
Morula (8-16 blastomere structure called morula having similar types of cells)
↓
Blastula (more than 16 blastomere (approx.-64) it is hollow structure
With blastocoel cavity in center)
↓
Gastrula (Transformation of the blastocyst in the gastrula with primary germ layer by rearrangement a cell called gastrulation and structure is called gastrula)

17 **(b)**
In rabbit, man and other placental mammals, fertilization takes place in the upper part of the fallopian tube (ampulla).

18 **(a)**
Placenta release oestrogens, progesterone, hCG and relaxin. That's why it can be considered as endocrine gland

19 **(b)**
Trophoblast.
The trophoblast encircles the blastocoel and inner mass cell. The inner mass cell is the precursor of the embryo. It means that inner mass give rise to embryo. The cells of the trophoblast helps to provide the nutrition to the embryo. The cells of the trophoblast form extra embryonic membranes namely chorion and amnion. The cells of the trophoblast which are in contact with inner mass are called cells of raubers



Implantation of blastocyst

20 **(a)**
Extra embryonic membrane are also called foetal membrane.
Extraembryonic or Foetal Membranes
The growing embryo/foetus develops four membranes called the extraembryoic or foetal membranes. These include chorion, aminion, allantois and yolk sac
(i) **Chorion** It is made up of trophoblast outside and somatopleuric extraembryonic mesoderm inside. It completely surrounds the embryo and protects it. It also takes part in the formation of placenta
(ii) **Amnion** It is composed of trophoblast inside and somatopleuric extraembryonic mesoderm outside. The space between the embryo and the amnion is called the amniotic cavity, which is filled with a clear, watery fluid secreted by both

the embryo and the membrane. The amniotic fluid prevents dessication of the embryo and acts as a protective cushion that absorbs shocks

(iii) **Allantois** The allantois is composed of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. It is a sac like structure, which arises from the gut of the embryo near the yolk sac. In human the allantois is small and non-functional except for furnishing blood vessels to the placenta

(iv) **Yolk Sac** The primary yolk sac consists of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. The yolk sac is non-functional in human beings except that it functions as the site of early blood cell formation

21 **(a)**

Capacitation is the activation of sperm in mammals, which takes place in female genital duct. The secretory cells of epithelial lining of oviduct mucosa secrete viscous fluid, which activates the sperms due to which sperms get motile for fusion with egg.

22 **(c)**

Epididymis stores the sperm and also secretes a fluid, which is considered to nourish the sperm. In epididymis the sperms are stored for few hours to few days till sent out through ejaculations and Sperms, if not ejaculated are reabsorbed. Testis and epididymis are together called testides

23 **(c)**

In human female, the large plasma surge of luteinizing hormone (LH) causes induction of ovulation (release of ovum).

24 **(b)**

Progesterone and oestrogen, level of both rises in luteal or secretory phase

Menstrual cycle

Phases	Days	Events
Menstrual phase	1-5	Endometrium breaks down, menstruation begins. The cells of endometrium, secretions, blood and the unfertilized ovum constitute the menstrual flow. Progesterone and LH production is reduced
Follicular phase (proliferative phase)	6-13	Endometrium rebuilds, FSH secretion and oestrogen's secretion increase
Ovulatory phase	14	Both LH and FSH attain a peak level. Concentration of oestrogen in the blood is also high and reaches its peak, Ovulation occurs
Luteal phase (secretory phase)	15-28	Corpus luteum secretes progesterone. Endometrium thickens and uterine glands become secretory

25 **(b)**

Spermatogenesis is the process of the formation of haploid spermatozoa (sperms) from the undifferentiated diploid primordial germs cells of the testes, which involves multiplication phase, growth phase, maturation phase and differentiation phase, whereas Spermiogenesis is the process to transformation of spermatids intospermatozoa (sperms) which involves differentiation phase.

26 **(b)**

There are many enzymes in the acrosome like fertilisin, hyaluronidase, pectin corona penetrating enzyme, acrosin etc., together they are called sperm lysins

27 **(a)**

Alimentary canal and respiratory structure are endodermal in origin.

28 **(c)**

Graafian follicle is the mature follicle present in the ovary. It consists of an outermost layer called theca externa and inner to it is theca interna.

29 **(b)**

If mammalian ovum fails to get fertilized, the oestrogen secretion does not decrease further.

30 **(d)**

Spermatogonium

↓ Mitosis and differentiation

Primary spermatocytes

↓ Meiosis-I

Secondary spermatocytes

↓ Meiosis-II

Spermatids

↓ Differentiation

Spermatozoa

31 **(b)**

Allantois is an extra embryonic membrane developed as an outgrowth from hindgut. In the eggs of reptiles and birds, it functions as a urinary bladder and stores the waste excretory products. It also provides oxygen (in reptiles, birds and mammals) and food (in mammals) to the embryo.

32 **(b)**

A-Pelvic wall; B-Ligament, C-Peripheral cortex; D-Inner medulla

33 **(b)**

Labia majora (female external genitalia) homologous to the scrotum of male

34 **(a)**

After ovulation, frog Graafian follicle acts as an endocrine gland because it secretes progesterone hormone for the maintenance of pregnancy.

35 **(a)**

According to the theory of error catastrophe, the damage to mechanisms that synthesize proteins, results in faulty proteins, which accumulate to a level and causes catastrophic damage to cells, tissues and organs.

36 **(b)**

Rete testis is connected to caput epididymis by 12-20 fine tubules called vasa efferentia or ductuli efference. These collect sperms from inside the testis and transfer them to the epididymis. Vas deferens arises from cauda epididymis, conducts, sperms from epididymis to urethra.

37 **(b)**

Doctors inject oxytocin hormone for the strong contraction of uterine wall.

Parturition

(i) The average duration of human pregnancy is about 9 months which is called the gestation period

(ii) The act of expelling the full term foetus from the mother's uterus at the end of gestation period is called parturition

(iii) It is induced by a complex neuroendocrine mechanism

(iv) Parturition signals originates from the fully developed foetus and the palcenta, which induce mild uterine contractions called foetus ejection reflex

(v) This triggers the release of oxytocin from the maternal pituitary

(vi) Oxytocin induces stronger uterine muscle contractions

(vii) Relaxin increases the flexibility of the pubic symphysis and ligaments that helps to dilate the uterine cervix during labour pain

(viii) This leads to the expulsion of baby

38 **(a)**

If fertilization occurs and foetus is implanted in the endometrium, the trophoblast cells of the developing placenta secrete a hormone human Chorionic Gonadotrophic (hCG).This hormone, like LH, maintains the corpus luteum and the secretion of progesterone and estradiol by it. These two hormones check the breakdown of the endometrium of the uterus. The absence of menstrual bleeding is the earliest sign of pregnancy.

39 **(b)**

The ruptured follicle of ovary after ovulation gives rise to corpus luteun which is the source for secretion of progesterone. This hormone is responsible for growth and maintenance of foetus. Oestrogen is produced by theca interna cells of Graafian follicles.

Male hormone called androgen is produced by interstitial calls of Leydig.

40 **(c)**

By supply of oestrogen and progesterone, the menstruation can be deferred.

41 **(b)**

Allantois si the extraembryonic membrane that develops in embryon of reptiles, birds and mammals as a growth from the hindgut. It acts as a urinary bladder for the storage of waste products and as means of providing the embryo with oxygen and food.

42 **(c)**

Statement I is false. Sperm live for some time in petridish but when they don't get appropriate environment, they will die. At $-196°C$ they can be stored for years. This is the temperature which is maintained at sperm bank

Statement II is true. Because sperm contain prostaglandins which causes uterine wall to contract

43 **(c)**
Ovulation takes place at the 14-16th day of menstrual cycle. This is indicated by arrow *C* in the diagram. Menstruation is the shedding of endometrium wall of the uterus. It takes place at the 1-5 day of the beginning of menstrual cycle, which is indicated by arrow A

44 **(c)**
The epithelium of seminiferous tubule is made up of two types of cells- Sertoli's cells and spermatogenic cells. Sertoli's cells nourish spermatozoa, act as nurse cells for differentiating spermatozoa phagocytize defective sperm and secrete protein hormone inhibin (which inhibits FSH secretion).

45 **(a)**
Ovum receives the sperm in the region of animal pole. The sperm fuses with ovum to form diploid zygote. The pole of ovum opposite to animal pole is coiled vegetal pole.

46 **(a)**
Endocrine Functions of Placenta Placenta secretes some hormones such as oestrogen, progesterone, human Chorionic Gonadotropin (hCG), human Chorionic Somato-mammotropin (hCS), Chorionic thyrotrophin, chorionic corticotropin and relaxin. hCS was formarly known as human placental lactogen. The hCG stimulates and maintains the corpus luteum to secrete progesterone until the end of pregnancy.
The hCS stimulates the growth of the mammary gland during pregnancy. Relaxin facailitates parturition (act of child birth) by softening of the connective tissue of the pubic symphysis

47 **(b)**
Thalidomide should not be used during pregnancy because even a single dose of thalidomide can cause severe birth defects such as phocomelia (underdeveloped limbs) in foetus or foetal death.

48 **(d)**
Gasrtulation is characterized by the presence of archenteron, three germinal layers (ectoderm, mesoderm, and endoderm) and morphogenetic movements.

49 **(a)**
Fertilization
The process of fusion of a sperm (male gamete) with an ovum (female gamete) is called fertilization
Steps
(i) During coitus, semen is released by the penis into the vagina (insemination)
(ii) The motile sperms swim rapidly through the cervix, enter into the uterus and reach the ampullary isthmic junction of the oviduct (site of fertilization)
(iii) A sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane to block the entry of additional sperms
(iv) The enzymes of the acrosome of sperm help to dissolve zona pellucida and plasma membrane of the ovum and sperm head is allowed to enter into the cytoplasm of the ovum, *i.e.,* secondary oocyte
(v) Ultimately diploid zygote is produced by the fusion of a sperm and an ovum

50 **(a)**
Scrotum maintains the temperature of testis, which is 2-2.5°C below the body temperature. In winter they reduces their surface area for preventing heat loss, so that temperature remains 34.5-35°C. In summer it increase their surface area for cooling, so that the temperature remains 34.5-35°C

51 **(c)**
Follicular phase is also called the proliferative phase.
Generally, menstrual cycle have four phases
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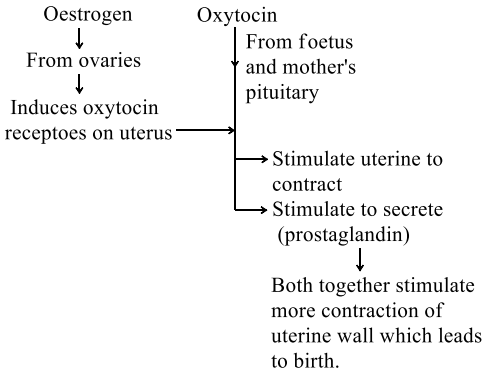
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation

52 **(b)**
A- Oestrogen, B-Oxytocin, C- Prostaglandin.

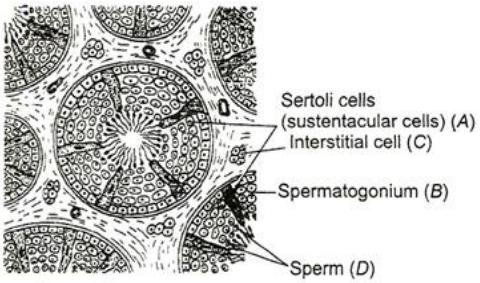


53 **(c)**
A-epididymis; B-Posterior

54 **(a)**
Epididymis is a mass of coiled tubules attached to the posterior surface of the testes. It stores the sperms temporarily. Sperms achieve maturity and motility in epididymis by reabsorption of fluid secreted originally by the seminiferous tubules and by chemicals produced by the lining of epididymal tube.

55 **(a)**
Sertoli cells are also called subtentacular cells

56 **(c)**
Each seminiferous tubules is lined on its inside by two types of cells called **male germ cells** (spermatogonium) and **Sertoli cells**



A part of transverse section of mammalian testis

57 **(d)**
A-Alveoli, B-Milk, C-Mammary duct

58 **(d)**
Nucleus of ovum is called female pronucleus.
Capacitation takes about 5-6 hours.
Capacitation of Sperm The sperms in the female is genital tract are made capable of fertilizing the egg by the secretion of female genital tract. These secretions of the female genital tract removes the coating substances deposited on the surface of the sperms, particularly those on acrosome. Thus, the receptor sites on the acrosome are exposed and sperm become active to penetrate the egg. This phenomenon of sperm activation in mammals is called capacitation. It takes about 5-6 hr for capacitation of sperm

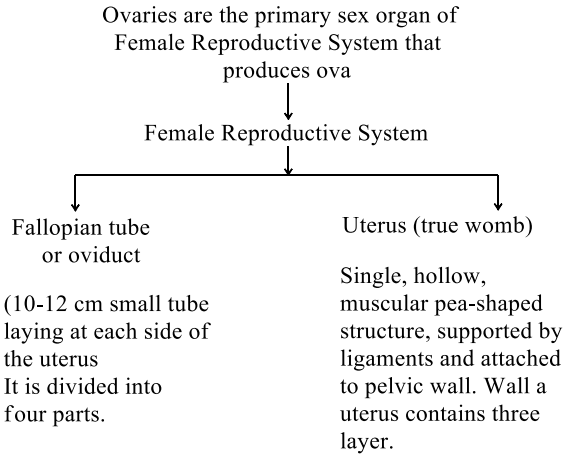
59 **(a)**
To produce test tube baby, the egg fertilized outside the human body, is placed in the womb of the mother, where the gastrula period is completed.

60 **(a)**
Ovum is a secondary oocyte which is released from mature Graafian follicle of an ovary

61 **(d)**
Sperm lysins contains hyaluronidase, corona penetrating enzyme, acrosin etc.
There are many enzymes in the acrosome like fertilisin, hyaluronidase, pectin corona penetrating enzyme, acrosin etc., together they are called sperm lysins

62 **(c)**
Seminal plasma is the combined secretion of three glands named (a) seminal vesicles (b) prostate gland (c) Cowper's gland, together with sperm they collectively form semen

63 **(c)**
Superior region (which is somewhat rounded in shape) of uterus is called fundus



1. Infundibulum
It is the opening of fallopian tube found

1. **Perimetrium**
Outer thin covering of uterus wall

near to ovaries

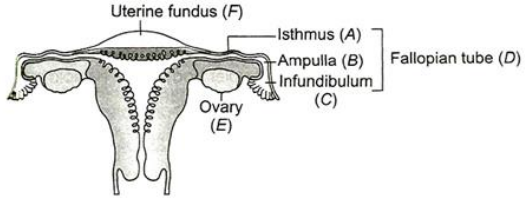
2. Fimbriae
Finger like projection for collecting ovum near to ovaries

3. Ampulla
Infundibulum leads to the wider part of oviduct

4. Isthmus
Last part of oviduct having a narrow lumen which joins the uterus

2. **Myometrium**
Middle thick layer or uterus wall

3. **Endometrium**
Inner layer of uterus that contains glands and many blood vesels



Female reproductive system

64 **(b)**
hCG (Human Chorionic Gonadotrophic) and HPH (Human Placental hormone) released during the pregnancy

65 **(a)**
The process of giving birth to a baby or delivery of foetus is called parturition. It starts with rise in oestrogen/progesterone ratio, increase in the level of oxytocin secretion by both mother and foetus.

66 **(d)**
Ovary is internally differentiated into four parts, *i.e.,* outer **germinal epithelium** of cubical cells, a delicate sheath of connective tissue or **tunica albuginea**, a cortex of dense connective tissue with reticular fibres, spindle-shaped cells, ovarian follicles and a few blood vessels while the central part of **medulla** is made of less dense connective tissue with elastic fibres, smooth muscles, a number of blood vessels and a few nerves.
Maturation of secondary oocyte is completed in mother's oviduct after the sperm entry into it for fertilization. 2° oocyte stops advancing further after the completion of metaphase-II. Sperm entry restart the cell cycle by breaking down MPF (Maturation Promoting Factor) and truning on APF (Anaphase Promoting Factor)

67 **(a)**
Lactation is, produring milk towards the end of pregnancy

68 **(b)**
During embryonic development of human, in the second cleavage division, one of the two blastomeres usually divides a little sooner then the second. Cleavage is series of mitotic cell divisions that increase the number of cells but does not change the size of the original mass.

69 **(b)**
Prolactin is secreted by anterior pituitary gland, which stimulates mammary gland development during pregnancy and lactation after child birth.

70 **(a)**
A-Follicle, B-Corona radiata, C-Zona pellucida

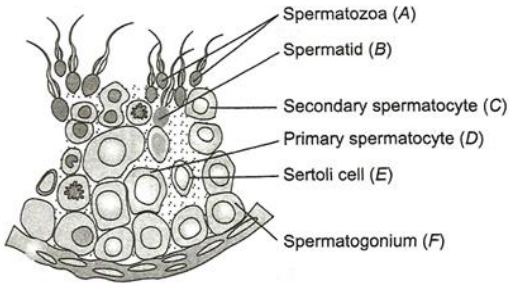
Enzymes of Acrosome	Working
Hyaluronidase	Hydrolysis of hyaluronic acid
Corona penetrating enzyme	Dissolve corona radiate
Zona lysine or acrosin	Digest zona pellucida

71 **(c)**
The corpus luteum secretes progesterone, which negatively feed back and inhibits the release of LH and FSH.
Generally, menstrual cycle have four phases
(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
(b) The unfertilized egg and soft tissue are discharged.
(c) It lasts 3-5 days.
(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.
(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.
(c) It least for about 10-14 days.
(iii) **Ovulatory Phase** (a) Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).
(b) It lasts for only about 48 hr.
(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.

c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation.
(d) Oestrogen and progesterone levels rise during this phase. It lasts for only 1 day. (e) During pregnancy all events of the menstrual cycle stop and there is no menstruation. The menstrual cycle permanently stops in females at the age of around 50 years. This is called **menopause**

72 **(d)**

Spermatogonium ($2n$)
↓
Primary spermatocytes ($2n$)
↓ meiosis-I
Secondary spermatocytes
↓ meiosis-II
Spermatids $\xrightarrow{\text{speriogenesis}}$ Spermatozoa



Diagrammatic sectional view of a seminiferous tubule

73 **(c)**

All systems (except nervous system, gills and lungs), muscles, bone, heart, blood, kidney, reproductive system, coelom, lymph node, spleen, eustachian tube, adrenal cortex develop from mesoderm.

74 **(a)**

In centrolecithal eggs, the yolk is surrounded by cytoplasm, *e.g.,* eggs of insects.

75 **(c)**

Whether a child died after normal birth or died before birth can be confirmed by measuring the weight of the child.

76 **(d)**

The movement of spermatozoa, from the epididymal duct and seminal fluid into the ejaculatory duct to the urethra is under the control of sympathetic nervous system. Ejaculation is the sympathetic response while erection is a parasympathetic response. Sympathetic and parasympathetic both are the part of autonomic nervous system.

Somatic Nervous System	Automatic Nervous System
Conscious or voluntary regulation	Functions without conscious awareness (involuntary)
Fibres do not synapse after they leave the CNS (single neuron from CNS to effector organ)	Fibres synapse once at a ganglion after they leave the CNS (two neuron chain motor control
Innervates skeletal muscle fibres, always stimulatory	Innervates smooth muscle, cardiac muscle and glands either stimulates or inhibits

77 **(a)**

Sertoli's cell are regulated by FSH (Follicle Stimulating Hormone) as the FSH receptors are confined to the Sertoli's cells.

78 **(c)**

The main function of seminiferous tubules is to produce spermatozoa. Inflammation of seminiferous tubules could interfere with the ability to produce spermatozoa

79 **(c)**

Gestation includes, fertilization, implantation and developmenty. It lasts from conception to hatching or birth.
Gestation period in rabbit – 28 to 30 days
In man - 280 days
In rat (minimum) - 15 days
In elephant (maximum) - 22 months

80 **(c)**

Nervous system consists of highly specialized cells called the neurons. The neurons defect and receive information from different sensory organs and integrate them to determine the mode of response of the body. Nervous system is **ectodermal** in origin.

81 **(a)**

A –Theca externa B-Theca interna,
C-Ovum D-Cumulus oophorus,
E-Antrum F-Membrana granulose

82 **(a)**

A typical mammalian sperm is flagellated consisting of four pats namely **head, neck, middle piece** and **tail**. During fertilization, whole of sperm enters into an ovum but tail is left outside.

83 **(a)**

After releasing ovum the structure left is called corpus luteum. It secretes progesterone, which maintains the pregnancy

84 **(b)**

External genitalia of male is called penis, which is the passage for both urine and sperm

85 **(a)**

The enzyme present in sperm acrosome are collectively called sperm lysins and containing:

(i) Hyaluronidase: Acts on the ground substance of follicle cells.

(ii) Corona penetrating enzyme: Dissolve corona radiata.

(iii) Zona lysin or **acrosin**: It helps to digest the zona pellucida.

86 **(b)**

In mammalian ovum during maturation phase, meiosis occurs. Nucleus shift towards animal pole and undergoes meiosis-I. After fertilization (penetration of sperm), the second meiotic division is completes with unequal cytoplasmic cleavage. This forms a large cell the ootid with essentially whole of the cytoplasm and a very small cell, the second polar body.

87 **(a)**

Luteal phase is also called secretory phase.

Generally, menstrual cycle have four phases

(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.

(b) The unfertilized egg and soft tissue are discharged.

(c) It lasts 3-5 days.

(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.

(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.

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(iii) **Ovulatory Phase** (a) Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).

(b) It lasts for only about 48 hr.

(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.

(b) The endometrium thickens further and their glands secrete a fluid into the uterus.

c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation

88 **(b)**

FSH (follicle Stimulating Hormone) is secreted from the anterior lobe of pituitary. It stimulates growth of ovarian follicles and secretion of oestrogen in female and spermatogenesis in male.

89 **(b)**

Starting of menstrual cycle $= 13$ th year of age.

Stopping of menstrual cycle $= 48$ years of age.

Duration of menstrual cycle are $= 48 - 13 = 35$ yr

Total no. of month is 35 years $= 35 \times 12 = 400$ months

One ova is released during one menstrual cycle (one months).

So, about 400 ova (follicles) will be produced by a women in its life time

91 **(c)**

Neubenkern is a part of middle piece of human sperm.

92 **(c)**

The forehead of the penis is covered by the skin. Foreskin and prepuce both terms are used for that skin

93 **(a)**

Interstitial cell secrets androgen (testosterone). *i.e.*, male sex hormones

Differences between Leydig's cells and Sertoli cells

Leydig's Cells (Interstitial Cells)	**Sertoli Cells** (Sustentacular Cells)
They are present in between the seminiferous tubules.	They are present in between the germinal epithelial cells of the seminiferous tubules.
Leydig's cells are found in small groups and are rounded in shape.	Sertoli cells are found singly and are elongated
They secrete andogens (*e. g.*, testosterone) male sex hormones	They provide nourishment to the developing spermatozoa (sperms). Sertoli cells secrete ABP (Androgen Binding Protein) that

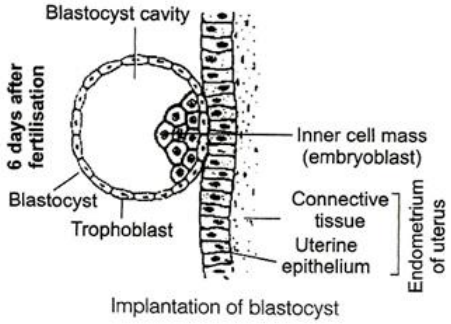
	concentrates testosterone in the seminiferous tubules. It also secretes another protein inhibin which suppresses FSH synthesis

94 **(d)**
Without the scrotal sac there is no maintenance of temperature and without the maintenance of temperature, there will be no sperm production

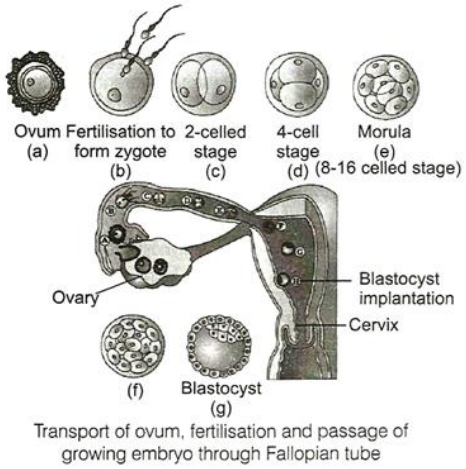
95 **(b)**
In mammalian embryo, trophoectoderm draws food for the developing cell.

96 **(a)**
In rabbit, sperms are produced in **seminiferous tubles**, which open into a network called **rete testes**. It opens by several fine ductless glands called **vasa efferentia**, into **epididymis**. The basal end of each epididymis leads into a muscular tube called **vas deferens**.

97 **(b)**
Implantation
(i) Zygote divides rapidly by mitotic division. This is called cleavage. As a result 2, 4, 8, 16 daughter cells are produced which are termed as blastomeres
(ii) Embryo with 8-16 blastomeres is called a morula
(iii) The morula changes into a large mass of cells called blastocyst, which passes further into the uterus
(iv) Blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called inner cell mass
(v) The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo
(vi) The cells of endometrium divide rapidly and cover the blastocyst
(vii) So, the blastocyst gets embedded in the endometrium of the uterus. This is called implantation, which leads to pregnancy
Blastocyst Formation At the next stage of development (morula), which produces an embryo with about 64 cells, a cavity is formed with in the cell mass. This cavity is called blastocyst cavity (blastocoel) and the embryo is termed as blastocyst.
Blastocyst composed of an outer envelops of cells the trophoblast or trophoectoderm and inner mass cell (embryoblast). The side of the blastocyst to which inner mass cell is attached is called embryonic pole (animal pole), while opposite side is the abembryonic pole
The trophoblast encircles the blastocoel and inner mass cell. The inner mass cell is the precursor of the embryo. It means that inner mass give rise to embryo. The cells of the trophoblast helps to provide the nutrition to the embryo. The cells of the trophoblast form extra embryonic membranes namely chorion and amnion. The cells of the trophoblast which are in contact with inner mass are called cells of raubers



Implantation of blastocyst



Transport of ovum, fertilisation and passage of growing embryo through Fallopian tube

98 **(b)**
Binary fission is a mode of vegetative reproduction, in which simple cell division takes place. The unicelled forms like diatoms, desmids, yeast, slime moulds, etc, multiply by this process.

99 **(d)**
Menstrual cycle (ovarian cycle) It is a series of cyclic changes that occur in the reproductive tract of human females and other primates with a periodicity of 28 days, right from menarche to menopause. It is characterized by menses or loss of blood for a few days
Generally, menstrual cycle have four phases

(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
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100 **(d)**
The outer surface of the chorion in humans develops a number of finger-like projection called chorionic villi. Because the chorion takes part in the formation of placenta, the human placenta is chorionic placenta. Amount of yolk is very less and found in yolk sac of foetal membranes of humans

101 **(b)**
The part of fallopian tube closer to the ovary is funnel-shaped infundibulum, which help in collection of the ovum after ovulation.

102 **(b)**
A-200, B-300, C-60%, D-40%

103 **(b)**
Acrosome present in head of sperm, is derived from Golgi complex. It secretes a lytic enzyme hyaluronidase, which helps in the penetration of ovum.

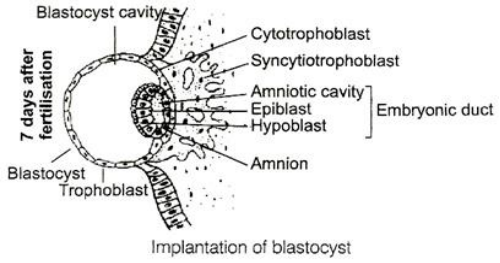
104 **(c)**
In previous Diagram F and A represents spermatogonium and spermatozoa

105 **(a)**
Second meiotic division give rise to haploid ovum ($1n$) and second polar body.
Oogenesis is the process of formation of mature ovum. *It has three phases*
(a) **Multiplication Phase** Oogenesis takes place in embryo stage. A couple of million of gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed after birth. These cells (oogonia) get into prophase-I of meiotic division. They get temporarily arrested as this stage called primary oocyte
(b) **Growth Phase** Each primary oocyte then gets surrounded by a layer of granulosa cells. This structure is called the primary follicle. A large number of these follicles degenerate during the phase from birth to puberty. At puberty, only 60000 and 80000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca to form secondary follicles
(c) **Maturation Phase** In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large haploid secondary oocyte and a tiny first polar body
The tertiary follicle changes into a mature follicle-the Graafian follicle which ruptures to release the secondary oocyte (ovum) from the ovary by a process called ovulation. The second maturation phase occurs after fertilization when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid)

106 **(a)**
Implantation It is the attachment of the blastocyst to the uterine wall. It occurs after 7 days of fertilization. About 8 days after fertilization, the trophoblast develops into two layers in the region of contact between the blastocyst and endometrium.
These layers are (a) **syncytiotrophoblast** that contains non-distinct cell boundaries and (b) **cytotrophoblast** between the inner cell mass and syncytiotrophoblast that is composed of distinct cells. The portion of the blastocyst where the inner cell mass is located lies against the endometrium of the uterus. The blastocyst sinks into a pit formed in the endometrium and gets completely buried in the endometrium. The

embedded blastocyst forms villi to get nourishment.

The cells of the inner cell mass differentiate into two layers (a) a layer of small, cuboidal cells known as the **hypoblast layer**, and (b) a layer of high columnar cells, the **epiblast layer**. Both the hypoblast and epiblast form a flat disc called the embryonic disc



Implantation of blastocyst

107 **(c)**

Secondary spermatocytes are haploid as these are formed after meiosis-I (reductional division).

108 **(c)**

In parturation there is strong uterine contraction leads to the expulsion of baby called child birth

109 **(a)**

Near the nipple mammary duct expand to form mammary ampullae (lactiferous sinuses) where some milk may be stored before going to **lactiferous duct**

110 **(c)**

The urethra originates from the urinary bladder and extends through the penis to its external opening called **urethral meatus**

111 **(d)**

Transfer of sperms by male in genital tract Gametes. *The major reproductive events in human beings are as follows*

(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)

(ii) **Insemination** It is the transfer of sperms by the male into the genital tract of the female

(iii) **Fertilization** Fusion of male and female gametes to form zygote is called fertilization

(iv) **Cleavage** It is rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst (blastula)

(v) **Implantation** It is the attachment of blastocyst to the uterine wall

(vi) **Placentation** It involves the formation of placenta which is the intimate connection between the foetus and uterine wall of the mother to exchange the materials

(vii) **Gastrulation** It is the process by which blastocyst is changed into gastrula with three primary germ layers

(viii) **Organogenesis** It is the formation of specific tissue, organs and organ systems from three primary germ layers

(ix) **Parturition** (child birth) it involves expelling of the baby from the mother's womb (uterus)

112 **(d)**

Sertoli's cells or nurse cells are found in the germinal epithelium of the seminiferous tubles, which nourish the developing sperms.

113 **(d)**

In growth curve, exponential phase or log phase is characterized rapid growth in population, which containues till enough food is available.

114 **(b)**

1st month.

Summary of important development changes in the human embryo

Time from Fertilisation	**Organ Formed**
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
Week 2	The three primary germ layers (ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing
Week 5	Brain developing, 'Limb buds', small swelling which are

	the beginning of the arms and legs. Heart is a large tube and starts to beat, pumping blood. This can be seen an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed. Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

116 **(a)**

Organogenesis is a formation a of organ, tissue, organ system.

Placentation is a connection between foetus and uterine wall.

Gametes. *The major reproductive events in human beings are as follows*

(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)

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117 **(a)**

Extraembryonic or Foetal Membranes

The growing embryo/foetus develops four membranes called the extraembryoic or foetal membranes. These include chorion, aminion, allantois and yolk sac

(i) **Chorion** It is made up of trophoblast outside and somatopleuric extraembryonic mesoderm inside. It completely surrounds the embryo and protects it. It also takes part in the formation of placenta

(ii) **Amnion** It is composed of trophoblast inside and somatopleuric extraembryonic mesoderm outside. The space between the embryo and the amnion is called the amniotic cavity, which is filled with a clear, watery fluid secreted by both the embryo and the membrane. The amniotic fluid prevents dessication of the embryo and acts as a protective cushion that absorbs shocks

(iii) **Allantois** The allantois is composed of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. It is a sac like structure, which arises from the gut of the embryo

near the yolk sac. In human the allantois is small and non-functional except for furnishing blood vessels to the placenta

(iv) **Yolk Sac** The primary yolk sac consists of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. The yolk sac is non-functional in human beings except that it functions as the site of early blood cell formation

118 **(b)**

In *in vitro* fertilization, the zygote or early embryos upto 8 blastomeres are transferred into the fallopian tube. If the embryo is more then 8 blastomeres then it is transferred into uterus called as IUD.

119 **(a)**

Proliferation of endometrium.

In the ovulatory phase, both LH and FSH attain a peak level in middle of cycle (about 14 day). Rapid secretion of LH induces rupturing of Graafian follicle and thereby releasing the ovum in human beings (secondary oocyte is released). This is called ovulation. Infact increase level of LH causes ovulation

120 **(a)**

Adrenal glands are paired structures located on the top of the kidneys. Each adrenal gland has two parts external adrenal **cortex** and internal adrenal **medulla**. The adrenal cortex is derived from the **mesoderm** of the embryo. The adrenal medulla develops from the **neuroectoderm** of the embryo.

121 **(d)**

In a bee hive, drones are the fertile males developed parthenogenetically from the unfertilized eggs. They possess very large eyes, small pointed mandibles and lack wax producing gland. The function of drones is to mate with the queen and fertilize her.

122 **(a)**

Role of Human Chorionic Gonadotropin

The trophoblastic cells secretes human chorionic gonadotropin hormone which has properties similar to those luteinizing hormone (LH) of the pituitary gland. It takes over the function of pituitary LH during pregnancy. HCG maintains the corpus luteum and stimulates it to secrete progesterone. The latter maintains the endometrium of the uterus and causes it to grow throughout pregnancy. This also prevent menstruation. Progesterone also causes increased secretion of mucus in the cervix of the uterus that forms a protective plug during pregnancy

123 **(a)**

Identical or monozygotic twins are siblings that develop from one egg, contain identical genetical information and are usually of very similar appearance. Any physical and mental differences detected between identical twins must arise, therefore, from enviromental difference, both before or after birth.

124 **(d)**

Vasa efferentia (Ductuli efferences) are 10-20 fine tubules which connect rete testis with an epididymis (Ductus epididymis). The latter is a pair of ducts from each testis which is formed by union of its vasa efferentia. If the vasa efferentia get blocked, the sperms will not be transported from testis to epididymis.

125 **(a)**

Ovulation occurs under the influence of LH and FSH of anterior pituitary gland.

126 **(d)**

Scrotum is homologous to labia majora in females. It is pouch of deeply pigmented skin divided into two separate sacs. Each sac contains one testis

128 **(c)**

Fertilized zygote is divided by special type of mitotic divisions, known as **cleavage**. Cleavage increases the number of cells.

129 **(b)**

Colostrum have antibody-A which work against the pathogenicity in newborn. So, it is recommended by doctors to feed new born from breast milk as for as possible

130 **(a)**

A-Cowper's gland

B-Urethra

C-Alkaline

D-Mucous

131 **(a)**

GIFT(Gamete Intra Fallopian Transfer) is the transfer of an ovum collected from a donor into the fallopian tube of another female who can not produce one but can provide suitable environment for fertilization and further development. In the same way ZIFT is used for zygote.

132 **(c)**

Maturation of sperm before penetration of egg is called **capacitation**.

The development of spermatozoa from germinal cells is called **spermatogenesis.**

Spermiogenesis is the differentiation of spermatids into spermatozoa.

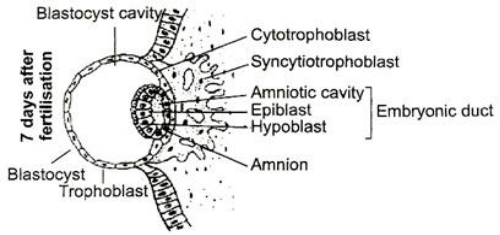
133 **(b)**

Implantation.

Implantation It is the attachment of the blastocyst to the uterine wall. It occurs after 7 days of fertilization. About 8 days after fertilization, the trophoblast develops into two layers in the region of contact between the blastocyst and endometrium.

These layers are (a) **syncytiotrophoblast** that contains non-distinct cell boundaries and (b) **cytotrophoblast** between the inner cell mass and syncytiotrophoblast that is composed of distinct cells. The portion of the blastocyst where the inner cell mass is located lies against the endometrium of the uterus. The blastocyst sinks into a pit formed in the endometrium and gets completely buried in the endometrium. The embedded blastocyst forms villi to get nourishment.

The cells of the inner cell mass differentiate into two layers (a) a layer of small, cuboidal cells known as the **hypoblast layer**, and (b) a layer of high columnar cells, the **epiblast layer**. Both the hypoblast and epiblast form a flat disc called the embryonic disc



Implantation of blastocyst

134 **(c)**

A-Spermatogenesis, B-Spermatogonia, C-Mitosis

135 **(c)**

A-primary; B-ovarian hormones

136 **(d)**

Menopause (Gr. *Men*-month; *pausis*;-*N*-cessation) It is a phase in woman's life when ovulation and menstruation stops. Is occurs between 45-55 years of age. Some woman have irregular cycles for months or years prior to menopauses other simply stops menstruating abruptly. Decline in oestrogen and progesterone level leads to menopause

137 **(c)**

Apoptosis is an active process of programmed cell death, characterized by cleavage of chromosomal DNA, chromatin condensation and fragmentation of both the nucleus and the cell.

138 **(c)**

Secondary spermatocytes. The first stage in spermatogenesis in which the chromosome number becomes half

Spermatogenesis Formation of spermatozoa from spermatogonia

Spermatogenesis has four phase

(i) **Multiplication Phase** Male germ cells (spermatogonia) present on the inside wall of seminiferous tubules multiply by mitotic division and increase their number.

(ii) **Growth Phase** One spermatogonia stop dividing and increase its size called primary spermatocytes, which is diploid.

(iii) **Multiplicative Phase** Primary spermatocytes divide by meiosis to give four haploid spermatids.

(iii) **Differanation Phase** Changing of spermatids to spermatozoa by the process called spermatogenesis. Releasing of sperm from seminiferous tubules called spermiation

139 **(a)**

The fallopian tube is about 10-20 cm long and extends from the periphery of each ovary to the uterus. The part closer to the ovary is the funnel shaped and is called infundibulum. The edged of the infundibulum possess finger-like projections called **fimbriate**, which help in collection of the ovum after ovulation. The uterus opens into vagina through a narrow cervix.

140 **(c)**

Middle piece of sperm contains mitochondria, centriole, axial filament

141 **(c)**

Ejaculation is the sympathetic response while erection is a parasympathetic response. Sympathetic and parasympathetic both are the part of autonomic nervous system.

Somatic Nervous System	Automatic Nervous System
Conscious or voluntary regulation	Functions without conscious awareness (involuntary)

Fibres do not synapse after they leave the CNS (single neuron from CNS to effector organ) Innervates skeletal muscle fibres, always stimulatory	Fibres synapse once at a ganglion after they leave the CNS (two neuron chain motor control Innervates smooth muscle, cardiac muscle and glands either stimulates or inhibits

142 **(d)**

There are two types of polar bodies found in oogenesis in meiosis-I the first polar body is formed and in meiosis-II the 2nd type of polar body is formed. Meiosis-I takes place before birth and meiosis-II after birth of female

143 **(a)**

B to C represents primary and tertiary follicles respectively.

Ovary is internally differentiated into four parts, *i.e.,* outer **germinal epithelium** of cubical cells, a delicate sheath of connective tissue or **tunica albuginea**, a cortex of dense connective tissue with reticular fibres, spindle-shaped cells, ovarian follicles and a few blood vessels while the central part of **medulla** is made of less dense connective tissue with elastic fibres, smooth muscles, a number of blood vessels and a few nerves.

Maturation of secondary oocyte is completed in mother's oviduct after the sperm entry into it for fertilization. 2° oocyte stops advancing further after the completion of metaphase-II. Sperm entry restart the cell cycle by breaking down MPF (Maturation Promoting Factor) and truning on APF (Anaphase Promoting Factor)

144 **(c)**

According to endocrine theory, the level of human growth hormone (hGH) declines to about half of adults with passage of time.

145 **(b)**

A-Ectoderm, B-Mesoderm, C-Endoderm

146 **(b)**

Luteal phase last for 15-28 days

Menstrual cycle

Phases	Days	Events
Menstrual phase	1-5	Endometrium breaks down, menstruation begins. The cells of endometrium, secretions, blood and the unfertilized ovum constitute the menstrual flow. Progesterone and LH production is reduced
Follicular phase (proliferative phase)	6-13	Endometrium rebuilds, FSH secretion and oestrogen's secretion increase
Ovulatory phase	14	Both LH and FSH attain a peak level. Concentration of oestrogen in the blood is also high and reaches its peak, Ovulation occurs
Luteal phase (secretory phase)	15-28	Corpus luteum secretes progesterone. Endometrium thickens and uterine glands become secretory

147 **(a)**

Saheli is the oral contraceptive contained oestrogen and progesterone

148 **(b)**

In diagram event labelled 'A' clearly indicates the releasing of ova. This takes place in menstrual cycle called ovulation

149 **(b)**

Vas deferens is large duct that arises from cauda epididymis and reach up to seminal vesicles.

150 **(b)**

A-Chorionic villi; B-Uterine tissue

151 **(b)**

Ovulation takes place in the menses between 14-16 days.

Menstrual cycle

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152 **(c)**

In mammals, the primary male sex organs, testes are located in the extra-abdominal scrotal sacs. Scrotum maintains a low temperature of $2-4°C$ below the temperature of abdominal cavity. As higher abdominal temperature kills the spermatogenic tissue So, testes in mammals are contained scrotal sacs present outside the abdominal cavity to have the low temperature that is needed for the formation and maturation of functional sperms.

153 **(c)**

Two major entities of testes are seminiferous tubules and Leydig cells (or interstitial cells). Sertoli cells and spermatozoa are contained in seminiferous tubules only. Rest of the portion of testis is covered by connective tissue

154 **(a)**

Oviducts are also called Fallopian tubes. These (two) terms are used interchangeability

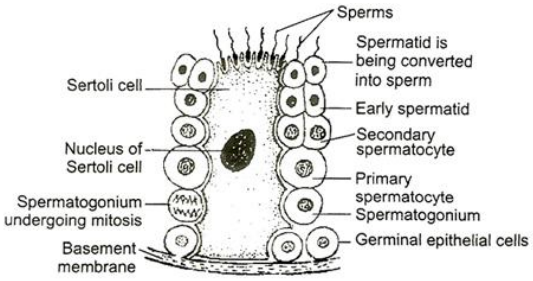
155 **(a)**

Seminal plasma is composed of the fluid and sperms from the vas deferens (about10% of the total), fluid from the seminal vesicles (almost 60%), fluid from the prostate gland (about 30%) and small amount of mucous gland secretions, especially the bulbourethral glands secretions. It contains calcium, citrate ion, phosphate ion a clotting enzyme, profibrinolysin, fructose, citrate, inositol, prostaglandins, several proteins, etc.

156 **(d)**

A- Leydig cells, B-Spermatogonium, C-Primary spermatocyte, D-Secondary spermatocyte, E-Spermatids, F- Sertoli cell.

Wall of each seminiferous tubules is formed of single layered germinal epithelium. Majority of cells in this epithelium are cuboidal called male germ cells (also called spermatogonia). At certain places there present tall Sertoli or substentacular cells, which functions as nurse cells for differentiating spermatozoa



TS of a part of seminiferous tubule showing Sertoli cell and stages of spermatogenesis

157 **(a)**

Frog is in amphibian, which possesses **telolecithal** eggs. In telolecithal eggs, the amount of yolk is concentrated in the one half of the egg to form the vegetative pole of the egg and thus makes polarity along the axis of yolk distriution.

158 **(b)**

During luteal phase of menstrual cycle, corpus luteum begins to secrete hormone called **progesterone**. The latter reaches its peak about 22^{nd} day after the beinning of cycle. In this phase uterus linning thickens further and becomes secretory. This stages is meant for receiving the fertilized ovum (implantation)

159 **(a)**

Ectoderm.

Fate of three germ layers

Mesoderm Dermis of skin, circulatory system, muscles, bones (except facial)

Endoderm Lining of Gl tract, lining of lungs, kidney ducts and bladder, thymus, thyroid tonsils

Ectoderm Epidermis of skin, tooth enamel, lens and cornea of the eye outer ear Brain and spinal cord, facial bones skeletal muscles in the head

160 **(a)**

Testes.

Differences between primary and secondary sex organs

Primary sex organs	Secondary sex organs
They produce gametes.	They do not produce gametes. They are concerned with the conduction of gametes.
They secrete sex hormones.	They do not secrete sex hormones.
Testes in males and ovaries in female are examples of primary sex organs.	Epididymis, vasa deferentia, penis, etc., are secondary sex organs in male and oviducts, uterus, etc., are examples of secondary sex organs in female.

161 **(b)**

The signals for parturition originates from the fully developed foetus and the placenta, which induce mild uterine contraception called foetal ejection reflex.

162 **(d)**

One time of ejaculation contains about 200 to 300 million sperms. If the sperm become less than 20 million then, it causes infertility

163 **(c)**

The duration of pregnancy in human being is about 9 month $\pm$7 days, which is called gestation period. Infact, the gestation period is the time from conception till birth

164 **(a)**

During growth phase of oogenesis, an egg nest forms ovarian follicle (Graafin follicle), one central oogonium grows and functions as primary oocyte. The others from the covering follicular cells. The later provide nourishment to primary oocyte. Yolk is deposited in this state. This phenomenon is called vitellogenesis.

165 **(b)**

Corpus luteum is a yelloow glandular mass in the ovary formed by the cells of ovarian follicle that has matured and discharged its ovum.

166 **(c)**

3rd month.

Summary of important development changes in the human embryo

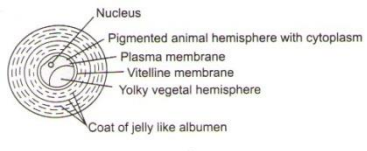
Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
Week 2	The three primary germ layers (ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing
Week 5	Brain developing, 'Limb buds', small swelling which are the beginning of the arms and legs. Heart is a large tube and starts to beat, pumping blood. This can be seen an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed.

	Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

167 **(c)**
Golgi body.
Acrosome is the part of sperm, which is found at the head region. It is the modified Golgi body that contain many enzymes for the penetration to ovum.
Acrosome contains hyaluronidase proteolytic enzymes, which is popularly known as sperm lysin as it is used to penetrate egg (ovum) at the time of fertilisaton

168 **(a)**
Frog's egg is spherical and about 1.6 mm in diameter with a convering of vitelline memrane and three concentric layers of albuminous jelly. The roughly one half blackish brown animal hemisphere containing most of the cytoplasm and large nucleus is uppermost, whereas the whitish vegetal hemisphere is lowermost.

An unfertilized ripe egg of frog is shown in the diagram below.



169 **(b)**
The acrosome of sperm contains large quantities of proteolytic enzymes, particularly hyaluronidase, which digests the hyaluronic acid, a constituent of the extracellular matrix. It allows the sperm to digest a path through the zona pellucida to the oocyte.

170 **(d)**
Foetal haemoglobin does not sickle even in those destined to have sickle cel anaemia, *i.e.,* haemoglobin of foetus has a higher affinity of oxygen than that of an adult.

171 **(b)**
Structure B in the diagram indicates the ova, which is in meiosis-I stage. Before birth all ova have this stage

172 **(a)**
Cleavage in human is simple holoblastic slow and synchronous. Cleavage in mammals ovum takes place during its passage through the fallopian tube to the uterus. The resultant cells of cleavage are called blastomeres.

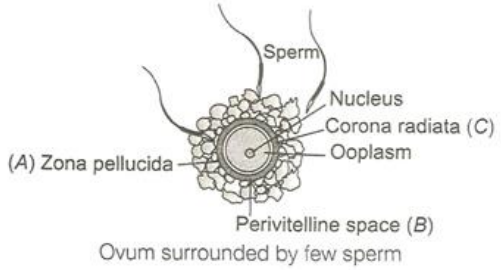
173 **(b)**
The chromatin material inside the nucleus is composed of DNA, some proteins and RNA. Thus, in an enucleated ovum, DNA will be present in mitochondria.
The mature RBCs, lack nucleus and membrane bound cell organelles, *i.e.,* lack DNA in nucleus and mitochondria.

174 **(b)**
Parthenogenesis refers to the development of unfertilized ovum into a new individual. In honey bee, drones develop parthenogenetically.

175 **(a)**
Stem cells are the specialized cell which can transform or differentiated into any kind of cells

176 **(c)**
Sperm entry stimulates the secondary oocyte to complete the suspended second meiotic division. This produces a haploid mature ovum and a second polar body. The head of the sperm which contains the nucleus separates from the middle piece and tail and becomes male pronucleus. The second polar body and the sperm tail degenerates. The nucleus of the ovum is now called female pronucleus. The male and female pronucleus move towards each other. Their nuclear membrane disintegrates; mixing up of the chromosome of a sperm and an ovum is called *karyogamy* or amphimixis. The fertilized ovum

(egg) is now called zygote

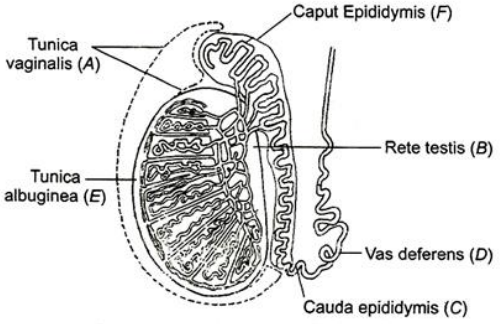


Ovum surrounded by few sperm

177 **(a)**
Hyaluronidase enzyme assists in acrosomal reaction. This enzyme acts on the ground substances of follicle cells

178 **(b)**
Leydig's cells or interstitial cells lie between the seminiferous tubules and secrete the male hormone, testosterone that controls spermatogenesis.

179 **(c)**
Protective Coverings (tunicae) **of Testis** Testis is surrounded by three coverings (layers)
(i) **Tunica Vaginalis** It is the outer covering of the testis
(ii) **Tunica Albuginea** It is the fibrous covering surrounding the testis, situated under tunica vaginalis
(iii) **Tunica Vasculosa** Consist of network of capillaries supported by delicate connective tissue which lines the tunica albuginea.



LS of mammalian testis and different ducts

180 **(d)**
Sertoli cells present in the mammalian testis, nourishes the sperms. That's why Sertoli cells are also called nurse cells. These cells also produces the inhibin hormone which halts spermatogenesis

181 **(c)**
Progesterone hormone is the main hormone, which maintains the endometrium wall.
Generally, menstrual cycle have four phases
(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
(b) The unfertilized egg and soft tissue are discharged.
(c) It lasts 3-5 days.
(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.
(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.
(c) It least for about 10-14 days.
(iii) **Ovulatory Phase** (a) Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).
(b) It lasts for only about 48 hr.
(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation

182 **(c)**
The target of Interstitial Cell Stimulating Hormone (ICSH) is the interstitial cell. Interstitial cells produces testosterone which is responsible for the development of secondary sexual characters

183 **(d)**
Oestrogen hormone is screted by growing ovarian follicles during menstrual cycle. It provokes a thickening of the endometrium (proliferative phase or menstrual cycle).

184 **(c)**
Seminal vesicles secrete and alkaline, nutritive, spermatozoa activating fluid called seminal fluid which forms about 60% part of semen. This fluid contains various substances like fructose, citrate, inositol, prostaglandins and several proteins. Sperms use fructose as an energy source (respiratory substrate).

185 **(c)**
Teratogens, which produces abnormality in the developing embryo.
Thalidomide is a drug which causes no or underdevelopment of the limbs (phoeomelia)

186 **(b)**
Human cell contain 46 chromosomes including 44 autosomes. Primary spermatocyte contain $2n$

number of chromosome *i.e.,* the number of autosomes, will be 44.

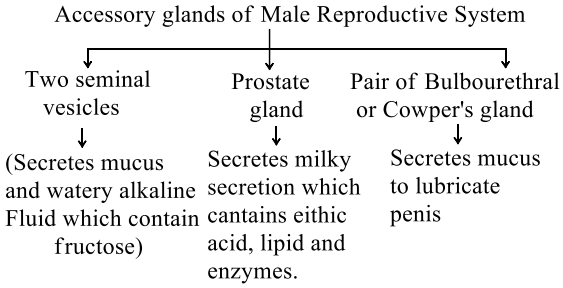
187 **(b)**
Seminal vesicles are present at the base of bladder and joins to the ejaculatory duct. They produces alkaline secretion, which forms 60% of the semen. Their secretion contains, fructose, prostaglandin and clotting factor

188 **(b)**
The part of the Fallopian tubes (oviducts) closer to the ovary is the funnel-shaped infundibulum. The edges of the infundibulum possess finger-like projections called **fimbriae**, which help in collection of the ovum after ovulation

189 **(a)**
Saheli is a new oral contraceptive for the females. It contains a non-steroidal preparation. It is once a weeks' pill with very low side effects and high contraceptive value.

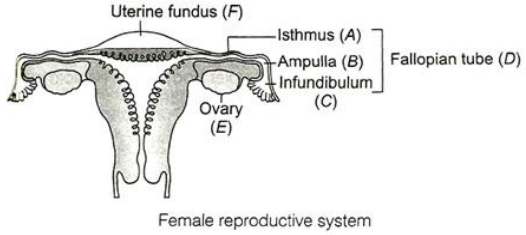
190 **(b)**
Sertoli cells.
Sertoli cells present in the mammalian testis, nourishes the sperms. That's why Sertoli cells are also called nurse cells. These cells also produces the inhibin hormone which halts spermatogenesis

191 **(c)**
A-Vas deferens, B-Seminal vesicle, C-Prostate gland, D-Bulbourethral gland.



External genitalia of humans is called **penis**. Its outer skin, which covers the forehead of penis called foreskin or prepuce. It is the single opening for semen and urine in males

192 **(c)**
A- Isthums, B- Ampulla, C-Infundibulum, D-Fallopian tube, E-Ovary, F-Uterine fundus



Female reproductive system

193 **(a)**
In the given options, only labia minora belongs to the external genitalia of females

194 **(b)**
Development of corpus luteum is done by progesterone and LH not by FSH. Progesterone and LH are secreted by anterior lobe of pituitary

195 **(c)**
Ejaculatory Ducts The ejaculatory ducts are the two short tubes each formed by the union of ducts from seminal vesicle and vas deferens. They pass through the prostate gland and join the prostatic part of the urethra. The ejaculatory ducts are composed of the fibrous, muscular and columnar epithelial tissue. Ejaculatory ducts carry sperms and secretion of seminal vesicles

196 **(a)**
Zygote is implanted in human female at 32-celled stage because fertilized egg in human are not divide beyond 32-celled stage in natural zygote.

197 **(a)**
Notochord, connective tissues including loose areolar tissue, ligaments, tendons, dermis of skin, specialized connective tissue like adipose tissue, reticular tissue, cartilage and bones are mesodermal in origin.

198 **(a)**
Chorionic villi is the modification of outer trophoblast layer of blastocyst, which get attached to the endometrium of uterus. This is called implantation

199 **(c)**
Sperm entry stimulates the secondary oocyte to complete the suspended second meiotic division. This produces a haploid mature ovum and a second polar body. The head of the sperm which contains the nucleus separates from the middle piece and tail and becomes male pronucleus. The second polar body and the sperm tail degenerates. The nucleus of the ovum is now called female pronucleus. The male and female pronucleus move towards each other. Their nuclear membrane disintegrates; mixing up of the chromosome of a sperm and an ovum is called *karyogamy* or amphimixis. The fertilized ovum (egg) is now called zygote

200 **(b)**
A-GnRH, B-Hypothalamus, C-Anterior, D-LH, E-FSH

201 **(d)**

Sequence of spermatogenesis

Spermatogonium
↓
Primary spermatocytes
↓
Secondary spermatocytes
↓
Spermatocytes
↓
Spermatozoa

202 **(d)**
The amount of yolk determines the type of cleavage in the egg. In **superficial meroblastic cleavage**, the cleavage remains restricted to the peripheral portion of the egg. This type of cleavage occurs in arthropods especially insects.

i.e., centrolecithal eggs.

203 **(d)**
All fishes are oviparous, but whale is viviparous, *i.e.*, it gives birth to young ones and it also feeds its young ones. Among flying creatures, bat is viviparous. Whale and bat both are mammals.

204 **(a)**
Oestrogen is the dominant hormone controlling the proliferative phase of the uterine endometrium layer

205 **(a)**
In certain cases, where normal fertilization is not possible, ovum from the female and the sperm from the male are fused by *in vitro* technique. The zygote, later on, is implanted in the uterus, where futher development takes place. **Patrick Steptoe** and **Robert Edwards** first time developed '**test tube baby technique**' in 1978.

206 **(d)**
Menstruation is caused by the reduction of oestrogen and progesterone, especially **progesterone** at the end of monthly ovarian cycle.

207 **(c)**
Fertilization takes place in ampulla of oviduct or ampullary isthmic junction

208 **(b)**
In teloecithal egg, yolk is unevenly distributed and most of the amount of yolk is found at the vegetal pole, *e.g.,* eggs of amphibians.

209 **(b)**
Oestrogen concentration remains almost constant and produce throughout the menstrual cycle Generally, menstrual cycle have four phases

(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
(b) The unfertilized egg and soft tissue are discharged.
(c) It lasts 3-5 days.
(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.
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(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation.
(d) Oestrogen and progesterone levels rise during this phase. It lasts for only 1 day. (e) During pregnancy all events of the menstrual cycle stop and there is no menstruation. The menstrual cycle permanently stops in females at the age of around 50 years. This is called **menopause**

210 **(c)**
Oestrogen is secreted by the cells of Graafin follicles. It is the principal feminizing hormone responsible for the development of secondary sexual characters and female reproductive organs.

211 **(c)**
Due to lack of progesterone, uterine endmetrium, epithelial glands and connective tissue are broken in menstrual cycle.

212 **(b)**
During normal menstruation approximately 40 mL of blood and an additional 35 mL of serous fluid are lost. The menstrual fluid is normally non-clotting because a fibrinolysin is releasted alongwith necrotic endometrial material.

213 **(b)**

In ovulatory phase, release of ova occurs due to the rapid increase in LH called LH surge. It last for maximum two days

214 **(b)**

In beginning, the corpus luteum degenerates because of decreasing LH and progesterone level. This leads to the degradation at endometrium wall

215 **(d)**

Oogonia (*A*)

↓ Miosis (cell division)

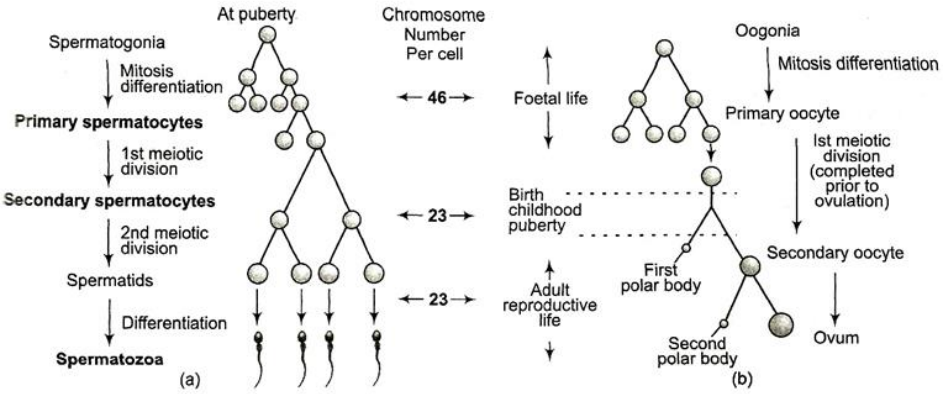
Primary oocyte (*B*)

↓ Meiosis-I (completed prior to ovation)

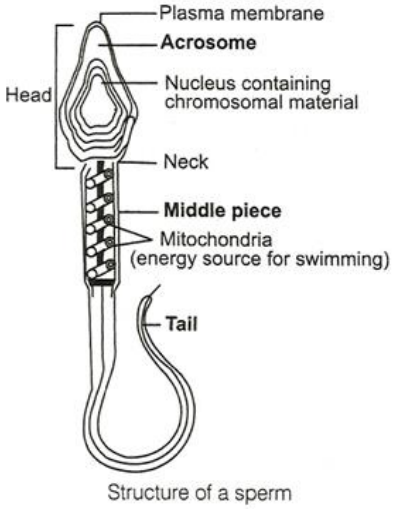
Secondary oocyte (*C*)

↓ Meiosis-II

Ovum



Schematic representation of (a) Spermatogenesis (b) Oogenesis



Structure of a sperm

216 **(a)**

The fusion of a haploid male gamete (sperm) and a haploid female gamete (ovum) to form zygote is called fertilization. Fertilization takes places in fallopian tube of human.

217 **(b)**

A- Chorion, B-Amnion, C- Yolk sac, D- Allantois.

Extraembryonic or Foetal Membranes

The growing embryo/foetus develops four membranes called the extraembryoic or foetal membranes. These include chorion, aminion, allantois and yolk sac

(i) **Chorion** It is made up of trophoblast outside and somatopleuric extraembryonic mesoderm inside. It completely surrounds the embryo and protects it. It also takes part in the formation of placenta

(ii) **Amnion** It is composed of trophoblast inside and somatopleuric extraembryonic mesoderm outside. The space between the embryo and the amnion is called the amniotic cavity, which is

filled with a clear, watery fluid secreted by both the embryo and the membrane. The amniotic fluid prevents dessication of the embryo and acts as a protective cushion that absorbs shocks

(iii) **Allantois** The allantois is composed of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. It is a sac like structure, which arises from the gut of the embryo near the yolk sac. In human the allantois is small and non-functional except for furnishing blood vessels to the placenta

(iv) **Yolk Sac** The primary yolk sac consists of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. The yolk sac is non-functional in human beings except that it functions as the site of early blood cell formation

218 **(a)**

Oogenesis starts in the foetal stage. Till the time of birth they remains in prophase-I. The oogenesis resumes at the time of puberty by GnRH produced by hypothalamus

219 **(a)**

Vulva or urinogenital opening is the opening of vestibule which inturn consists jointly the opening of vagina

(*i.e,* vaginal orifice), urethra (urethral orifice) and hymen.

220 **(a)**

Trophoblast ia an epithelium surrounding the mammalian blastocyst forming outer layer of chorion and becoming part of the embryonic component of extra-embryonic membranes.

221 **(b)**

Relaxin is secreted by ovary. Relaxin increases the flexibility of the pubic symphysis and ligaments of the sacroiliac and sacrococcygeal joints that helps to dilate the uterine cervix during labour pain

222 **(a)**

Testosterone.

Region outside the seminiferous tubules is called interdigital space, which is lined by interstitial cells also called Leydig cells. Leydig cells secretes testosterone and also called endocrine part of the testis

223 **(c)**

Sertoli's cells, seminiferous tubules and Leydig's cells, all are present in testes, while Graafian follicles are present in ovary of mammals.

224 **(d)**

A- Mammary duct, B-Mammary duct, C-Lactiferous duct, D-Areola

The glandular tissue comprises about 15-20 lobes in each breast. Each lobe is made up of number of lobules.

Each lobule is composed of grape like cluster of milk secreting glands termed as alveoli. When milk is produced, it passes from alveoli into **mammary lobules** and into the mammary ducts

Internally, the breast consists of the glandular tissue forming mammary glands, the fibrous tissue (connective tissue) and the fatty or adipose tissue. Mammary glands are modified **sweat glands**

225 **(a)**

During **maturation** phase, each primary oocyte undergoes two maturation divisions, first meiotic and second mitotic. In the first meiotic division, the primary oocyte divides into a large secondary oocyte and small first **polar body** or polocyte.

226 **(a)**

Umbilical cord connects the foetus to placenta of mother. It mainly consists of allantoic mesoderm and blood vessels (umbilical artery and veins).

227 **(a)**

Structure of a sperm (spermatozoa) It consists of four parts *i.e.,* Head, Neck, Middle piece and tail, enveloped by a plasma membrane.

Head It is the enlarged end of a sperm, containing the large haploid nucleus, *i.e.,* condensed chromatin body and is capped by **acrosome**. The acrosome contains hydrolytic enzymes that help in dissolving membranes of the ovum for fertilization.

Neck It contains proximal centriole which is necessary for the first cleavage division of zygote and the distal centriole that is connected to the tail filament.

Middle piece It contains a number of mitochondria that provide energy for the movement of the tail that facilitate sperm motility essential or fertilization.

Tail It consists of axial filaments surrounded by the plasma membrane. It helps the sperms to swim in a fluid medium

228 **(c)**

Sperm has mitochondria at its middle part. This middle part gives energy for the motility to the sperm.

Structure of a sperm (spermatozoa) It consists of four parts *i.e.,* Head, Neck, Middle piece and tail, enveloped by a plasma membrane.

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Tail It consists of axial filaments surrounded by the plasma membrane. It helps the sperms to swim in a fluid medium

229 **(c)**

Usually, the cytoplasm of ova is without centrioles, because during the second maturation division, the centrioles are taken away by the second polar body.

230 **(d)**

5th month.

Summary of important development changes in the human embryo

Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
Week 2	The three primary germ layers (ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing
Week 5	Brain developing, 'Limb buds', small swelling which are the beginning of the arms and legs. Heart is a large tube and starts to beat, pumping blood. This can be seen an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed. Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating

By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

231 **(d)**
A-Sexually, B-Viviparous, C-Internal, D-Haploid, E-Diploid, F-Ovulation, G-LH, H-Fertilisation, I-Blastocyst, J-Placenta

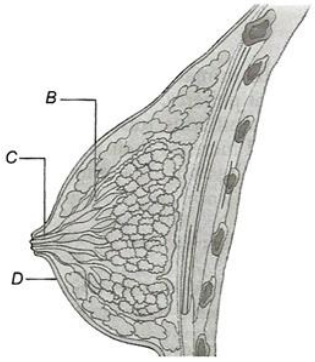
232 **(b)**
A - Vas deferens B- Seminal vesicle

C-Prostate gland D- Bulbourethral gland

233 **(c)**
Blastopore is found in gastrula. Gastrula is characterized by ectoderm, endoderm, archenteron and blastopore, dorsal lip of blastopore has organiser properties. If dorsal lip is removed, organ formation does not take place.

234 **(c)**
Fructose, prostaglandin, clotting factor
Seminal vesicles are present at the base of bladder and joins to the ejaculatory duct. They produces alkaline secretion, which forms 60% of the semen. Their secretion contains, fructose, prostaglandin and clotting factor

235 **(b)**
Sectional view of mammary gland shows.



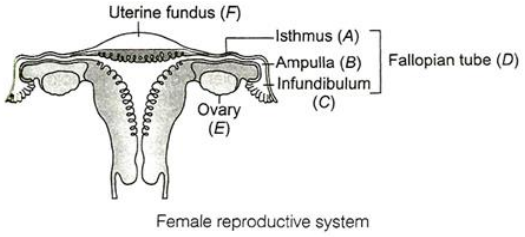
(i) Nipple areola
(ii) Mammary lobe (alveolus) and duct
(iii) Ampulla and lactiferous duct

236 **(a)**
Cowper's gland
Greater vestibular glands (Bartholin's gland) are packed glands situated on each side of vaginal orifice. These glands are homologous to male bulbourethral (Cowper's) gland and secretes viscus fluid that supplements the lubrication during sexual intercourse.
The lesser vestibular glands (paraurethral glands or glands of Skene) are numerous minute glands that are present on either side of the urethral orifice (opening). These glands are homologous to the male prostate glands and secrete mucus

237 **(c)**
Holoblastic cleavage is complete division of zygote, e.g., frog.

238 **(b)**
Postnatal.
Development periods It includes embryonic or prenatal and post embryonic or postnatal (natal concerning birth)
(i) Embryonic period (prenatal period) In human beings is passed in mother's womb (uterus). It includes the events from the formation of an embryo till the time of birth
(ii) Post embryonic period (postnatal period). This period is passed outside the mother's womb. It includes events from birth to the death

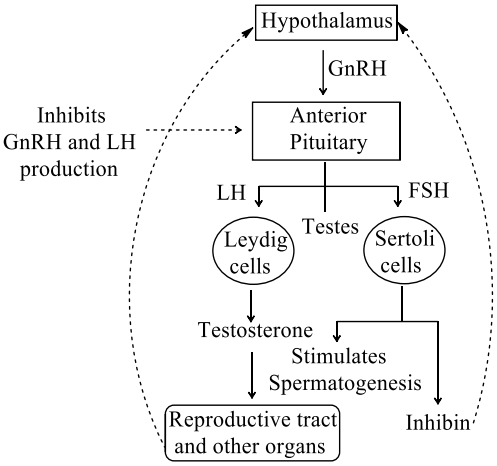
239 **(c)**
In female reproductive system
(i) Egg produced by ovary
(ii) Fertilization takes place in the ampulla of oviduct
(iii) Implantation takes place in the wall of uterus
(iv) Oestrogen and progesterone are produced by ovary
(v) Part receive the male genitalia (penis) during copulation is vagina.
A- Isthums, B- Ampulla, C-Infundibulum, D-Fallopian tube, E-Ovary, F-Uterine fundus



Female reproductive system

240 **(a)**
Hormonal Control of Spermatogenesis
Spermatogenesis is initiated due to the increase in Gonadotropin Releasing Hormone (GnRH) by hypothalamus. GnRH acts on the anterior lobe of the pituitary gland to secrete Luteinising Hormone (LH) and Follicle Stimulating Hormone (FSH). LH acts on the Leydig cells of the testis to secreted testosterone.
FSH acts on the sertoli cells of the seminiferous tubules of the testis to secrete an androgen binding protein (ABP) and inhibin. ABP concentrates testosterone in the seminiferous tubules. Inhibin suppresses FSH synthesis. FSH

act on spermatogonia to stimulate sperm production



Hormonal control of male reproductive system

Dark line – Positive feed back

Dot line – Negative feed back

241 **(a)**

In the given options only acrosome belong to the male reproductive system. Rest of the options (corpus luteum, endometrium, Graafian follicle) belongs to the female reproductive system

242 **(b)**

Human placental lactogen stimulates growth and development of breast in preparation for lactation. This hormone is needed before oestrogen and progesterone can have their effects on breasts.

243 **(c)**

Ovulation (release of egg or ovum from ovary into body cavity) involves the extrusion of a secondary oocyte from the ovary. Actually by 10-14 days after the first day of menstruation, only one follicle has contained its growth to become a fully mature Graafian follicle, while other follicles regress through a process called follicle atresia. Under proper hormonal stimulation, Graafian follicle rupture and extrude its oocyte into the uterine tube in the process of ovulation.

244 **(b)**

Seminal vesicle produce 60% of the semen and gives alkaline medium to the sperm for the nutralisation of vaginal acidic medium

245 **(d)**

A- Cervix B- Uterine cavity

C-fallopian tube D-Ovary

246 **(a)**

2nd month.

Summary of important development changes in the human embryo

Time from Fertilisation	**Organ Formed**
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
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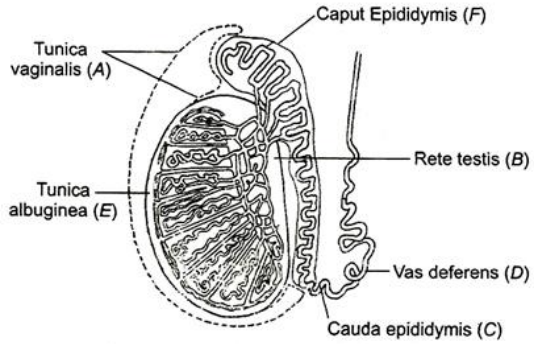
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

247 **(a)**

FSH (Follicle Stimulating Hormone), secreted by anterior lobe of pituitary, stimulates sperm formation in male and growth of ovarian follicles in the females.

248 **(c)**

Testis is covered by tough compact fibrous capsule called **tunica albuginea**, which is externally covered by peritoneal layer of flat cells called **tunica vaginalis**; which is supplied by a network of blood capillaries called **tunica vasculosa**



LS of mammalian testis and different ducts

249 **(d)**

Inhibin is a glycoprotein hormone secreted from the Sertoli's cells. It is involved in the negative feedback control of sperm production.

250 **(a)**

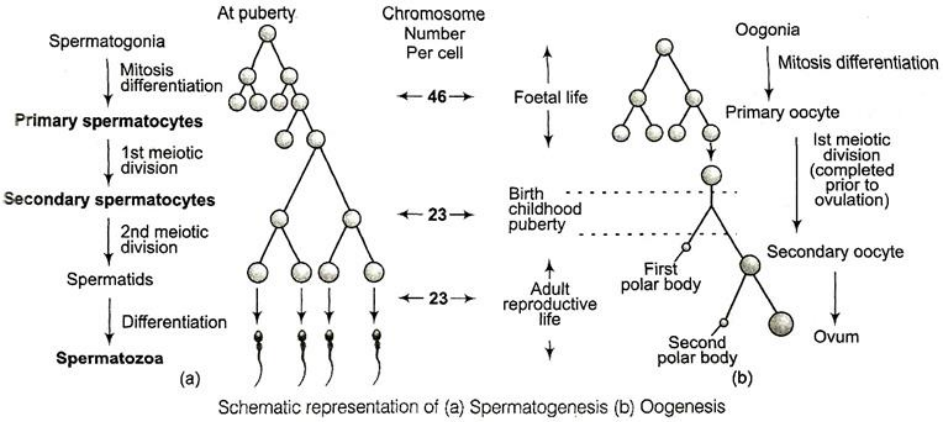
Inner cell mass forms embryonic disc, which is composed of two layers, ectoderm above and endoderm below. Once the embryonic disc elongates, to form primitive streak which forms mesoderm.

251 **(b)**

Capacitation of Sperm The sperms in the female is genital tract are made capable of fertilizing the egg by the secretion of female genital tract. These secretions of the female genital tract removes the coating substances deposited on the surface of the sperms, particularly those on acrosome. Thus, the receptor sites on the acrosome are exposed and sperm become active to penetrate the egg. This phenomenon of sperm activation in mammals is called capacitation. It takes about 5-6 hr for capacitation of sperm

252 **(c)**

Primary oocyte surrounded by a layer of granulosa cell called primary follicle which are 2n in number.



Schematic representation of (a) Spermatogenesis (b) Oogenesis

Oogenesis is the process of formation of mature ovum. *It has three phases*

(a) **Multiplication Phase** Oogenesis takes place in embryo stage. A couple of million of gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed after birth. These cells (oogonia) get into prophase-I of meiotic division. They get temporarily arrested as this stage called primary oocyte

(b) **Growth Phase** Each primary oocyte then gets surrounded by a layer of granulosa cells. This structure is called the primary follicle. A large number of these follicles degenerate during the phase from birth to puberty. At puberty, only 60000 and 80000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca to form secondary follicles

(c) **Maturation Phase** In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large haploid secondary oocyte and a tiny first polar body

The tertiary follicle changes into a mature follicle-the Graafian follicle which ruptures to release the secondary oocyte (ovum) from the ovary by a process called ovulation. The second maturation phase occurs after fertilization when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid)

253 **(b)**
After one week of fertilization, implantation begins to starts. During implantation, the trophoectoderm (trophoblast) comes in contact with the endometrium of the uterus and sinks into a pit formed in the endometrium and gets completely burried in the endometrium.

254 **(c)**
Oestrogen is secreted from the ovary and regulates growth and development of female accessary reproductive organs, secondary sexual characters and behaviour, so when both ovaries are removed. Oestrogen level will decrease in blood.

255 **(d)**
Testosteron is a steroid hormone and causes development of secondary sexual characters in male.
Gestation period of rabbit is approximately 28 to 32 days.
Bulbourethral glands are the pea-sized glands inferior to the prostate. These glands secrete a fluid that lubricates urethra and the end of penis.
Before ovulation, oestrogens are secreted from Graafian follicle. Placenta also secretes some amount of oestrogens.

256 **(c)**
Corpus luteum acts as an endocrine gland. It is formed from the remaining structure of mature Graafian follicle which rupture at the time of ovulation and release ovum. Corona radiata and cumulus rophorus. It produces progesterone hormone during the second half of the menstrual cycle. It prepares the lining of uterus for implantation of fertilized egg.

257 **(b)**
The embryo with about 64 cells is termed as blastocyst. The process of attachment of blastocyst with the uterine wall of mother is called **implantation**. It occurs after 7 days of fertilization.

258 **(b)**
A-seminal vesicles; B-urethra

259 **(a)**
Fate of three germ layers
Mesoderm Dermis of skin, circulatory system, muscles, bones (except facial)
Endoderm Lining of Gl tract, lining of lungs, kidney ducts and bladder, thymus, thyroid tonsils
Ectoderm Epidermis of skin, tooth enamel, lens and cornea of the eye outer ear Brain and spinal cord, facial bones skeletal muscles in the head

260 **(a)**
A-Chorion; B-Placenta

261 **(a)**
Intra Uterine Device (IUD) is a small device made up of copper, plastic or stainless steel. It is inserted into uterus by a doctor and left in place. It prevents implantation and may cause bleeding and discomfort.

262 **(c)**
At present, the most widely accepted method of contraception in India is IUDs (Intra Uterine Devices). These devices are effective and popuar.

These devices are inserted by doctors and expert nurses in the uterus through vagina.

265 **(d)**

A chemical fertilizin is a glycoprotein or acid mucopolysaccharide produced from mature eggs. Dur to it, sperms migrate towards ova.

266 **(b)**

Prolactin, FSH, LH

267 **(b)**

The growth of superficial and middle layer of endometrium occurs from the 5th to 14th day of the cycle under the influence of oestrogen.

268 **(b)**

Semen is collection of secretions from the seminal vesicles, prostate gland and Cowper's glands and sperms from testis. A single ejaculation may contain 200-300 million spermatozoa (sperms) of which atleast 60% sperms must have normal shape and size and atleast 40% of them must show vigorous motility for normal fertility. Semen has a pH of 7.35-7.50; its alkalinity helps to neutralize the acidity of the urethra protects the sperms from the acidity of the vagina

269 **(b)**

In human female reproductive cycle or menstrual cycle during proliferative phase, the anterior lobe of pituitary gland secretes the Follicle Stimulating Hormone (FSH), which stimulates to ovarian follicles to secrete oestrogens. During the second week of reproduction cycle, most of the developing follicle die and usually one follicle continues to mature. Now the Luteinzing Hormone (LH) in blood level increase by pituitary gland. A small surge of FSH also occurs. Now ovulation takes place, which releases immature egg into abdominal cavity. During ovulation, the follicle breaks open and collapses under the continuous influence of Luteinizing Hormone(LH). It begins to enlarge and forms a yellowish strucyure, called corpus luteum or yellow body.

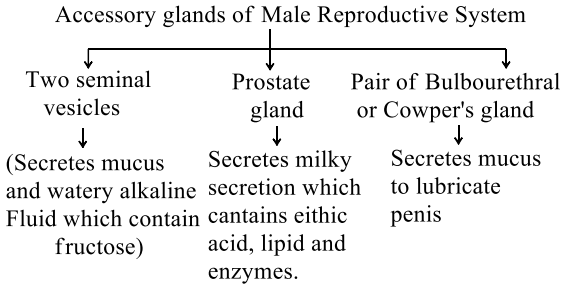
270 **(a)**

Internally, the breast consists of the glandular tissue forming mammary glands, the fibrous tissue (connective tissue) and the fatty or adipose tissue. Mammary glands are modified **sweat glands**

271 **(a)**

A tertiary follicle changes into the mature follicle or Graafian follicle. The secondary oocyte forms a new membrane called zona pellucida surrounding it. The Graafian follicle ruptures to release the secondary oocyte (ovum) from the ovary by the process called ovulation

272 **(b)**



External genitalia of humans is called **penis**. Its outer skin, which covers the forehead of penis called foreskin or prepuce. It is the single opening for semen and urine in males

273 **(b)**

FSH and LH.

Hormonal Control of Spermatogenesis

Spermatogenesis is initiated due to the increase in Gonadotropin Releasing Hormone (GnRH) by hypothalamus. GnRH acts on the anterior lobe of the pituitary gland to secrete Luteinising Hormone (LH) and Follicle Stimulating Hormone (FSH). LH acts on the Leydig cells of the testis to secreted testosterone.

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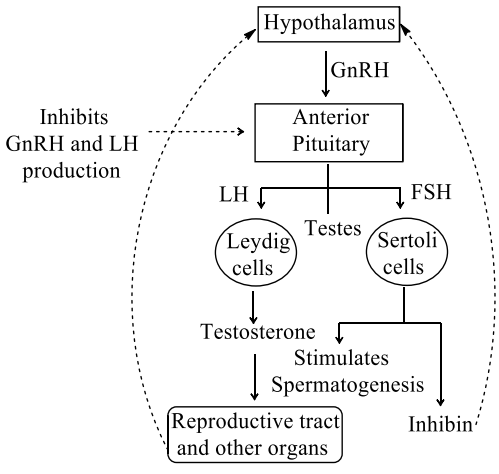

Hormonal control of male reproductive system

Dark line – Positive feed back

Dot line – Negative feed back

274 **(a)**

Female gamete mother cells are called oogonia. **Oogenesis** is the process of formation of mature ovum. *It has three phases*

(a) **Multiplication Phase** Oogenesis takes place in embryo stage. A couple of million of gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed after birth. These cells (oogonia) get into prophase-I of meiotic division. They get temporarily arrested as this stage called primary oocyte

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276 **(b)**

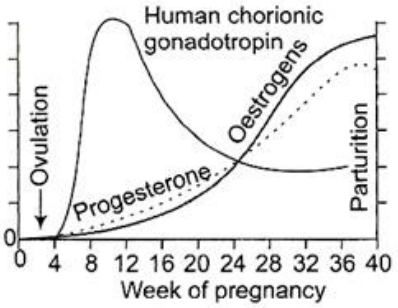
A-Oogonia-46 chromosomes, B-Primary oocyte-46 chromosomes, C-Secondary oocyte-23 chromosomes

277 **(c)**

In spermatogenesis, primary spermatocyte undergoes meiosis-I and as a result of which two haploid secondary spermatocytes formed. Thus, for the given case secondary spermatocyte possesses 8 chromosomes, *i.e.,* n=8 and 16 chromatids because each chromosome divides along its length into two chromatids.

278 **(d)**

hCG, hpG, and relaxin are produced during pregnancy. During pregnancy the level of other hormone like oestrogen, progesterone, cortisol, prolactin, thyroxin, etc., are increased several folds in maternal blood. Increased production of these hormones is essential for supporting the foetal growth, metabolic changes in the mother and maintenance of pregnancy



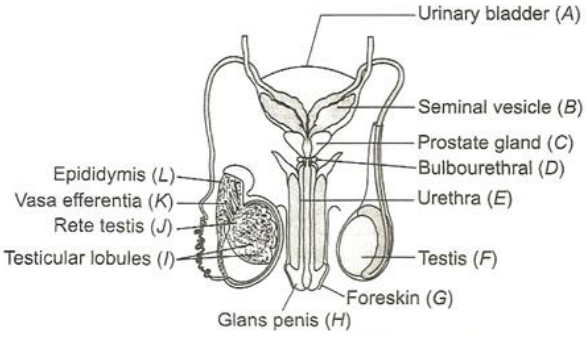
279 **(a)**

A-Labia minora, B-Hymen, C-Clitoris

280 **(b)**

Rete Testis and Vasa Efferentia

The seminiferous tubules are closed at one end but on the other side they join to a network called rete testis from where fine ciliated ductules called **vasa efferentia** arises



Diagrammatic view of male reproductive system

281 **(b)**

A-Amnion; B-Amniotic cavity

282 **(d)**

All of the above.

Placenta release oestrogens, progesterone, hCG and relaxin. That's why it can be considered as endocrine gland

283 **(b)**

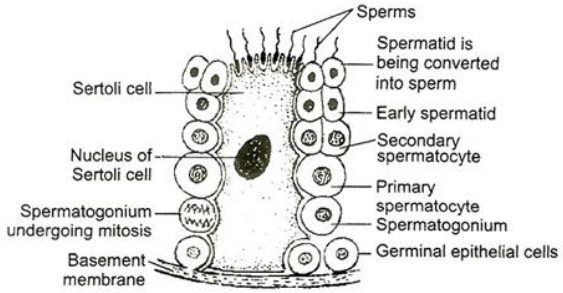
The scrotum remains connected with abdomen or pelvic cavity by **inguinal canals.** The spermatic cord formed from the spermatic artery, vein and nerve bound together with connective tissue, passes into the testis through inguinal canal

284 **(a)**

Ovulation is release of ovum LH secreted by anterior pituitary gland is responsible for ovulation.

285 **(a)**

Wall of each seminiferous tubules is formed of single layered germinal epithelium. Majority of cells in this epithelium are cuboidal called male germ cells (also called spermatogonia). At certain places there present tall Sertoli or substentacular cells, which functions as nurse cells for differentiating spermatozoa



TS of a part of seminiferous tubule showing Sertoli cell and stages of spermatogenesis

286 **(d)**

Paedogenesis literally means 'reproduction by the child'. Infact, it is reproduction by immature or larval animals caused by acceleration of mutation. Paedogenesis occurs in very small flies such as *Miastor* and in *Oligarces*.

287 **(a)**

A-Trophoblastic cell, B-Corpus luteum, C-Progesterone, D-Endometrium, E-Menstruation

288 **(b)**

Trophoectoderm (trophoblast).

It is the outer most layer of the cells of blastocyst. It forms the foetal part of placenta and do not form any part of the embryo proper

289 **(c)**

In birds and other polylecithal egg containing animals, cleavage (division) are restricted to a small part of cytoplasm and nucleus in animal pole of egg. Such type of cleavage is termed as 'meroblastic cleavage'.

290 **(b)**

Fusion of sperm and ova

Fertilization

The process of fusion of a sperm (male gamete) with an ovum (female gamete) is called fertilization

Steps

(i) During coitus, semen is released by the penis into the vagina (insemination)

(ii) The motile sperms swim rapidly through the cervix, enter into the uterus and reach the ampullary isthmic junction of the oviduct (site of fertilization)

(iii) A sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane to block the entry of additional sperms

(iv) The enzymes of the acrosome of sperm help to dissolve zona pellucida and plasma membrane of the ovum and sperm head is allowed to enter into the cytoplasm of the ovum, *i.e.,* secondary oocyte

(v) Ultimately diploid zygote is produced by the fusion of a sperm and an ovum

291 **(c)**

Maturation of sperm before penetration of egg is called **capacitation.**

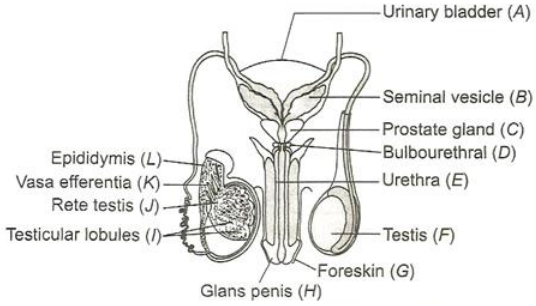
292 **(a)**

The end of menstrual cycle is known as **menopause**. It come at the age of 45 to 50 years. During menopause, the level of FSH (Follicle Stimulating Hormone) rises in urine.

293 **(c)**

E-Urethra, F-Testis, G-Foreskin, H-Glans penis

Male reproductive system is made up of a pair of testis, scrotum, vasa efferentia, a pair of epididymis, a pair of vasa deferentia, a pair of seminal vesicles, a pair of ejaculatory ducts, urethra, prostate gland, a pair of Cowper's gland and penis



Diagrammatic view of male reproductive system

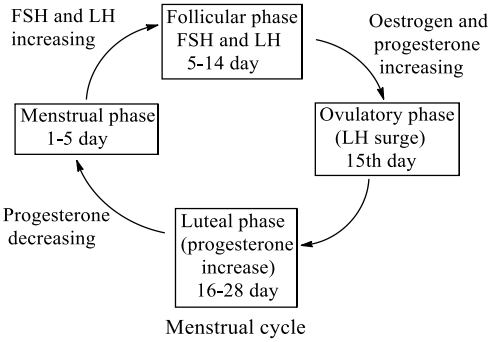
294 **(a)**

13-14 day (Proliferative phase)

FSH and LH have high concentration, whereas progesterone has low concentration.

16th-20th day (Luteal phase)

FSH and LH have low concentration, whereas progesterone has high concentration.



Menstrual cycle

295 **(a)**

Mammary glands are modified sweat glands that lie over the pectoral muscle. They occur in all female mammals and in a rudimentary from in all male mammals. In the human female, the mammary glands start to increase in size at puberty because of fat accumulation and reach their maximum development in approximately the twentieth year. These undergo additional development during pregnancy essential function of mammary gland is milk production which has nutritive and immunologic properties.

296 **(c)**

Differences between primary and secondary sex organs

Primary sex organs	Secondary sex organs
They produce gametes.	They do not produce gametes. They are concerned with the conduction of gametes.
They secrete sex hormones.	They do not secrete sex hormones.
Testes in males and ovaries in female are examples of primary sex organs.	Epididymis, vasa deferentia, penis, etc., are secondary sex organs in male and oviducts, uterus, etc., are examples of secondary sex organs in female.

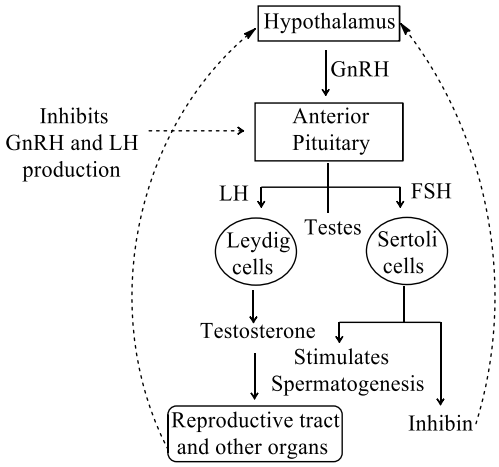
297 **(c)**

A-Testosterone, B-Sertoli cell, C-Inhibin.

Hormonal Control of Spermatogenesis

Spermatogenesis is initiated due to the increase in Gonadotropin Releasing Hormone (GnRH) by hypothalamus. GnRH acts on the anterior lobe of the pituitary gland to secrete Luteinising Hormone (LH) and Follicle Stimulating Hormone (FSH). LH acts on the Leydig cells of the testis to secreted testosterone.

FSH acts on the sertoli cells of the seminiferous tubules of the testis to secrete an androgen binding protein (ABP) and inhibin. ABP concentrates testosterone in the seminiferous tubules. Inhibin suppresses FSH synthesis. FSH act on spermatogonia to stimulate sperm production



Hormonal control of male reproductive system

Dark line – Positive feed back

Dot line – Negative feed back

298 **(a)**

In menstrual phase, the production of LH and progesterone decreases.

Menstrual cycle

Phases	Days	Events
Menstrual phase	1-5	Endometrium breaks down, menstruation begins. The cells of endometrium, secretions, blood and the unfertilized ovum constitute the menstrual flow. Progesterone and LH production is reduced
Follicular phase (proliferative phase)	6-13	Endometrium rebuilds, FSH secretion and oestrogen's secretion increase
Ovulatory phase	14	Both LH and FSH attain a peak level. Concentration of oestrogen in

		the blood is also high and reaches its peak, Ovulation occurs
Luteal phase (secretory phase)	15-28	Corpus luteum secretes progesterone. Endometrium thickens and uterine glands become secretory

299 **(a)**
In the middle piece of sperm, cytoplasm is found in the form of a thin sheet called **Manchette**.

300 **(d)**
Hormonal level during menstrual cycle
1-5 days (menstrual phase) Level of progesterone and LH decreases.
6-13 days (follicular or proliferative phase) FSH and LH level increases that also stimulates the level of oestrogen.
14 days (ovulatory phase) Both LH and FSH attains a peak level.
15-20 days (secretory phase) Level of progesterone increase

301 **(c)**
A woman with typical 28 day of menstrual/cycle is most likely to pregnant during 12-15 day because it is the period in which ovulation takes place due to LH surge

303 **(b)**
1. Infundibulum
It is the opening of fallopian tube found near to ovaries
2. Fimbriae
Finger like projection for collecting ovum near to ovaries
3. Ampulla
Infundibulum leads to the wider part of oviduct
4. Isthmus
Last part of oviduct having a narrow lumen which joins the uterus
1. **Perimetrium**
Outer thin covering of uterus wall
2. **Myometrium**
Middle thick layer or uterus wall
3. **Endometrium**
Inner layer of uterus that contains glands and many blood vesels

304 **(b)**
LH or ICSH acts on the Leyding cells, which secretes androgens. Testosterone is the principle androgen of male reproductive system

305 **(b)**
Athenospermia is the condition where the motility of sperms is highly reduced.

The condition of presence of completely non-motil sperms in human semen is known as **necrospermia.**

The condition when less number of sperms is found in semen is termed as **oligospermia**. The penetration of many sperms into an ovum simultaneously is termed as **polyspermy.**

306 **(b)**
A-Testis, B-Glands, C-Ducts, D- Genitalia

307 **(d)**
The secretion of testosterone by the Leydig's cells of the testis subseqently causes growth and development of the Wolffian ducts into male accessory sex organs, the epididymis, seminal vesicles and ejaculatory duct.

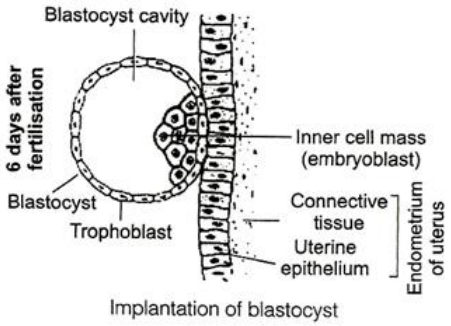
308 **(c)**
Second meiotic division takes place in ova after sperm and ova fusion. Proximal convulated tubules and distal convulated tubules at the neck region in sperm helps to complete the 2nd meiotic division

309 **(c)**
After the release of ova, the remaining structure left is called corpus luteum. Corpus luteum secretes progesterone which maintains the endometrium wall and pregnancy

310 **(c)**
Sertoli's cell provide nutrition to the sperm in testes.

311 **(a)**
Blastocyst Formation At the next stage of development (morula), which produces an embryo with about 64 cells, a cavity is formed with in the cell mass. This cavity is called blastocyst cavity (blastocoel) and the embryo is termed as blastocyst.
Blastocyst composed of an outer envelops of cells the trophoblast or trophoectoderm and inner mass cell (embryoblast). The side of the blastocyst to which inner mass cell is attached is called embryonic pole (animal pole), while opposite side is the abembryonic pole

The trophoblast encircles the blastocoel and inner mass cell. The inner mass cell is the precursor of the embryo. It means that inner mass give rise to embryo. The cells of the trophoblast helps to provide the nutrition to the embryo. The cells of the trophoblast form extra embryonic membranes namely chorion and amnion. The cells of the trophoblast which are in contact with inner mass are called cells of raubers



Implantation of blastocyst

Blastomeres are of two types

(i) **Trophoblast** It give nourishment to embryo by attaching it to endometrium wall

(ii) **Inner Mass of Cells** They give rise to three germ layers and form embryo

312 **(b)**

Leydig's cells are endocrine in nature and present in testes of mammals. These cells in other vertebrates except mammals are known as interstitial cells. These cells secrete male sex hormone testosterone, which influence secondary sexual charscters in males. Oestrogen is female sex hormone, secreted from Graafian follicles and responsible for secondary sexual characters in female.

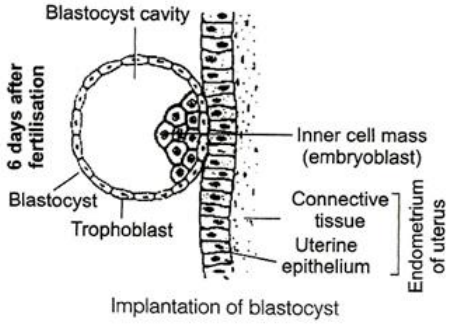
313 **(c)**

The cuboidal cells in germinal epithelium undergo mitosis to produce spermatogonia which grows into primary spermatocytes. These in turn undergoes meiosis producing haploid cells, firstly secondary spermatocytes and then spermatids. The latter get converted into spermatozoa (sperms). Sertoli cells provides nutrition to the developing sperms

314 **(b)**

Cells of rauber.

The trophoblast encircles the blastocoel and inner mass cell. The inner mass cell is the precursor of the embryo. It means that inner mass give rise to embryo. The cells of the trophoblast helps to provide the nutrition to the embryo. The cells of the trophoblast form extra embryonic membranes namely chorion and amnion. The cells of the trophoblast which are in contact with inner mass are called cells of raubers



Implantation of blastocyst

315 **(c)**

Cleavage is the series of rapid mitotic division of the zygote, which converts the single celled zygote into a multicellular structure called blastula.

316 **(d)**

Gastrula will be larger, while zygote and blastula will be of same size.

317 **(a)**

Vestibular gland.

Greater vestibular glands (Bartholin's gland) are packed glands situated on each side of vaginal orifice. These glands are homologous to male bulbourethral (Cowper's) gland and secretes viscus fluid that supplements the lubrication during sexual intercourse.

The lesser vestibular glands (paraurethral glands or glands of Skene) are numerous minute glands that are present on either side of the urethral orifice (opening). These glands are homologous to the male prostate glands and secrete mucus

318 **(a)**

The anterior portion of sperm head is covered by a cap-like structure, called **acrosome**. Acrosome is formed from the Golgi complex. It contains digestive enzyme hyaluronidase and proteinase. Acrosome plays an important role in penetration of ovum by sperm during fertilization.

319 **(c)**

Chorionic villi and uterine tissue become inter-digitated with each other and jointly form placenta

320 **(c)**

The corpus luteum plays an important role in the preparation of endometrium for the implantation of fertilized egg by secreting oestrogen and progesterone hormones. But if the egg is not fertilized then the corpus luteum begins to degenerate and it stops the production of

progesterone and oestrogen hormones, which causes shedding of the endometrium lining menstrual bleeding.

321 **(d)**

Spermatozoa contains a proteinaceous substances known as **anti-fertillizin.** It is a protein, which is composed of acidic amino acid.

322 **(b)**

During early and middle foetal life the testis are located in the abdominal cavity. They come to the scrotal sac in the late foetal development Cryptorchidism is the condition in which testis do not descent into the scrotum

323 **(a)**

The egg of human is almost free of yolk hence, called alecithal.

324 **(b)**

The cells formed by cleavage are called blastomere.

Implantation

(i) Zygote divides rapidly by mitotic division. This is called cleavage. As a result 2, 4, 8, 16 daughter cells are produced which are termed as blastomeres

(ii) Embryo with 8-16 blastomeres is called a morula

(iii) The morula changes into a large mass of cells called blastocyst, which passes further into the uterus

(iv) Blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called inner cell mass

(v) The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo

(vi) The cells of endometrium divide rapidly and cover the blastocyst

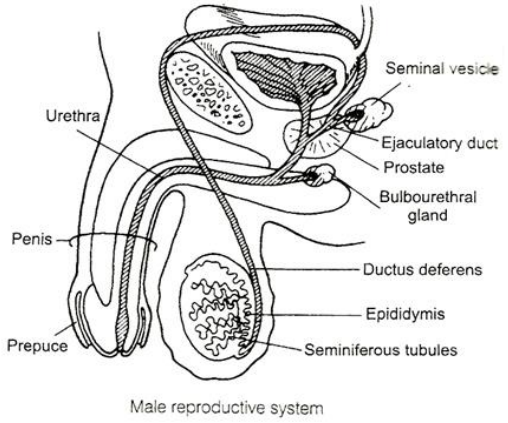
(vii) So, the blastocyst gets embedded in the endometrium of the uterus. This is called implantation, which leads to pregnancy

325 **(d)**

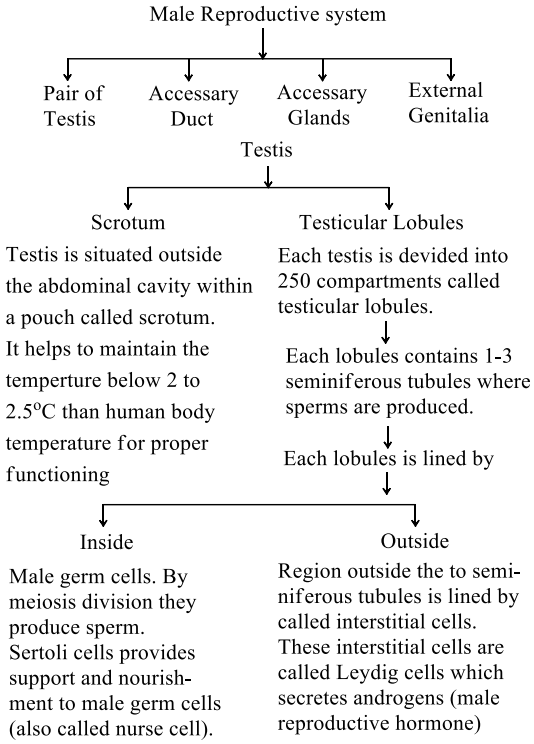
In frog , when 1st polar body is separated, the chromosome number becomes half.

326 **(d)**

Testicular lobules contains 1-3 seminiferous tublules.



Male reproductive system



327 **(d)**

Regeneration is the defined as replacement, repair or restoration of the lost or damaged structures or reconstitution of the whole body from a small fragment of it during post embryonic life of an organism. Brain cells have lowest power of regeneration due to highly specific differentiation.

328 **(d)**

Condoms, cervical caps, diaphragms and intrauterine contraceptive devices (IUCDs) are all mechamical irth control devices.

329 **(c)**

Amphimixis is the formation of new individuals through normal process of sexual reproduction (*i.e.,* meiosis and syngamy). Syngamy is the fusion of sperm nucleus with egg nucleus.

330 **(a)**

All bones are derived from the mesoderm but only facial bones which are derived from the ectoderm

331 **(a)**
Layers of an ovum from outside to inside are corona radiate, zona pellucida and vitelline membrane.

332 **(a)**
No more oogonia are formed and added after birth. Oogonia (egg mother cells) divide by mitosis forming primary oocyte. Each primary oocyte then gets surrounded by a layer of granulosa cell called primary follicle. A larger number of these follicles degenerate during the phase from birth to puberty. Therefore, at maturity only 60,000-80,000 primary follicles are left in each ovary

333 **(d)**
Menarche is the starting of menstruation in girl at about 13 year of age, whereas menopause is the period of life, when menstruation naturally stops.

334 **(b)**
Ovulation is the release of the secondary oocyte from the ovary. In humans, ovulation occurs about 14 days before the onset of the next menstruation.

335 **(b)**
Gastrulation is the formation of gastrula from blastula. It is that phase of embryonic development during which the cells of blastula move in small mass to attain the final location. Such movement of cells is called morphogenetic movement.

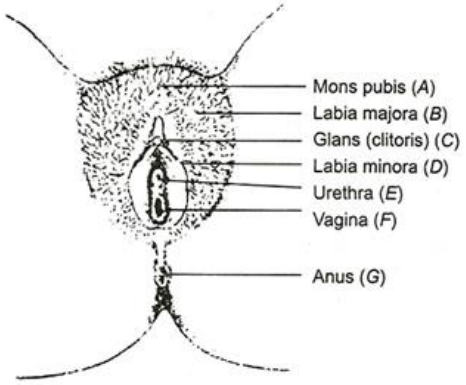
336 **(b)**
Secondary sexual characters and functioning of testicular interstitial cells depends upon the LH but spermatogenesis depends upon FSH

337 **(a)**
Epimorphosis is a process that replaces a lost organ of the body by proliferating new cells from the surface of the wound or injured part, *e.g.,* regeneration of tail in lizard, replacement of arm in starfish and limb in salamander.

338 **(c)**
A-Spermatogenesis; B-Sertoli cells

339 **(b)**
The external genitals of female are collectively called vulva. These include the protective coverings of skin folds called labia majora and labia minora. Clitoris is another accessory external reproductive organ of female. Labia majora and labia minora protect the vaginal and urethral openings beneath, while clitoris provides felling of pleasure during sexual stimulation.

340 **(a)**
External genitalia (vulva) of female has following parts
(i) **Mons Pubis** It is the anteriormost portion of the external genitalia which is covered by the skin and pubic hairs. It acts as a cushion during intercourse
(ii) **Labia Majora** These are fleshy folds of tissue which extend down from the mons pubis and surrounds the vaginal opening
(iii) **Labia Minora** These are paired folds of tissue under the labia majora
(iv) **Hymen** The opening of vagina covered partially by a membrane called hymen



External genitalia of female

(v) **Clitoris** is a tiny finger-like structure which lies at the upper junction of the two labia minora above urethral opening

341 **(a)**
Mature follicles are called Graafian follicles. After meiosis, the mature follicle gives rise to ovum, which represents the female gametocyte

342 **(a)**
Summary of important development changes in the human embryo

Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
Week 2	The three primary germ layers

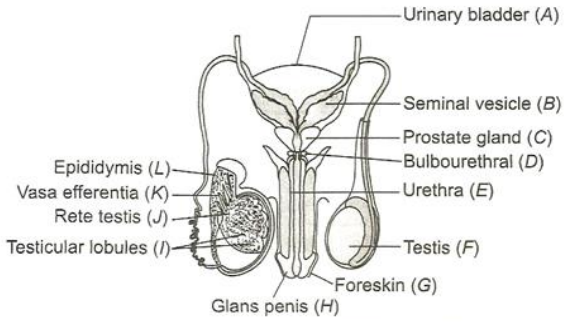
	(ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing
Week 5	Brain developing, 'Limb buds', small swelling which are the beginning of the arms and legs. Heart is a large tube and starts to beat, pumping blood. This can be seen an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed. Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

343 **(a)**

Amnion is formed of mesoderm on outside and ectoderm inside. It has no blood vessels. Space between amnion and foetus is amniotic cavity and it contains amniotic fluid Amnion protects foetus from mechanical shock.

344 **(b)**

Male reproductive system is made up of a pair of testis, scrotum, vasa efferentia, a pair of epididymis, a pair of vasa deferentia, a pair of seminal vesicles, a pair of ejaculatory ducts, urethra, prostate gland, a pair of Cowper's gland and penis



Diagrammatic view of male reproductive system

345 **(a)**

Gastrulation is the process by which a blastula is converted into gastrula. By the end of gastrulation three layered embryo is formed, which is enclosing an archenteron.

346 **(a)**

It is very necessary to reach the sperm at the ampullary region because, it is the site where ova waits for sperm for two days after ovulation. That's way all intercourse does not lead to fertilization

347 **(a)**

Blastocyst Formation At the next stage of development (morula), which produces an

embryo with about 64 cells, a cavity is formed with in the cell mass. This cavity is called blastocyst cavity (blastocoel) and the embryo is termed as blastocyst.

Blastocyst composed of an outer envelops of cells the trophoblast or trophoectoderm and inner mass cell (embryoblast). The side of the blastocyst to which inner mass cell is attached is called embryonic pole (animal pole), while opposite side is the abembryonic pole

348 **(b)**

In uterus the development of foetus takes place and this development lasts till parturition. Generally, in common language uterus is called womb

349 **(c)**

Oral contraceptive is a preparation consisting of one or more synthetic female sex hormones taken by woman to prevent conception. Most oral contraceptives are combined pills consisting of an oestrogen, which blocks the normal process of ovulation and progesterone, which acts on the pituitary gland to block the normal control of menstrual cycle.

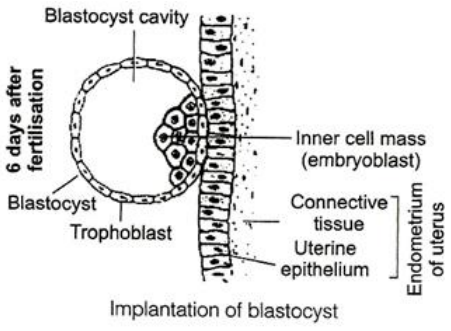
350 **(a)**

Morphallaxis involves the reconstruction of whole body from small fragment by reorganizing the existing cells, *e.g.,* Regeneration of *Hydra* from its piece

351 **(a)**

Nourishment.

The The trophoblast encircles the blastocoel and inner mass cell. The inner mass cell is the precursor of the embryo. It means that inner mass give rise to embryo. The cells of the trophoblast helps to provide the nutrition to the embryo. The cells of the trophoblast form extra embryonic membranes namely chorion and amnion. The cells of the trophoblast which are in contact with inner mass are called cells of raubers



Implantation of blastocyst

352 **(b)**

Labia majora, these are two large fleshy folds of skin which form the boundary of vulva. They are partly covered by pubic hair and contain large number of sebaceous (oil) glands. The labia majora are considered homologous to the scrotum of the male

353 **(a)**

The embryo at 16-celled stage is called the morula. It is the mass of cells resulting from the cleavage of the ovum before the formation of a blastula.

354 **(c)**

Gynogenesis leads to non-participation of male pronucleus in fertilization.

355 **(d)**

Ovulation takes place under the influence of LH and FSH. It normally takes place at the end of proliferative phase, *i.e*, 14th day or mid way during menstrual cycle.

356 **(b)**

Spermiation.

The transformation of spermatids into spermatozoa is called spermiogenesis or spermateliosis. The spermatids are later on known as sperms. After spermiogenesis head becomes embedded in the Sertoli cells and are finally released from the seminiferous tubules by process called spermiation

357 **(a)**

44 + XY→ Girl, 44 + XY→ Boy

358 **(d)**

The testes in humans are situated outside the abdominal cavity in scrotal sacs. This is because the temperature of scrotal sac is 25°C lesss than internal body temperature.

359 **(d)**

Vas deferens is not present in female rabbit because vas deferens is associated with male sex organs as these carry spermatozoa from cauda epididymis to the ejaculatory duct.

360 **(a)**

(A) Graafian follicle, (B) Zona pellucida, (C) Ovulation

361 **(d)**

Yolk sac.

Extraembryonic or Foetal Membranes

The growing embryo/foetus develops four membranes called the extraembryoic or foetal

membranes. These include chorion, aminion, allantois and yolk sac

(i) **Chorion** It is made up of trophoblast outside and somatopleuric extraembryonic mesoderm inside. It completely surrounds the embryo and protects it. It also takes part in the formation of placenta

(ii) **Amnion** It is composed of trophoblast inside and somatopleuric extraembryonic mesoderm outside. The space between the embryo and the amnion is called the amniotic cavity, which is filled with a clear, watery fluid secreted by both the embryo and the membrane. The amniotic fluid prevents dessication of the embryo and acts as a protective cushion that absorbs shocks

(iii) **Allantois** The allantois is composed of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. It is a sac like structure, which arises from the gut of the embryo near the yolk sac. In human the allantois is small and non-functional except for furnishing blood vessels to the placenta

(iv) **Yolk Sac** The primary yolk sac consists of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. The yolk sac is non-functional in human beings except that it functions as the site of early blood cell formation

362 **(b)**

The mature ovum or female gamete is spherical in shape. The human ovum is almost free of yolk and said to be alecithal. Its cytoplasm is called ooplasm containing large nucleus. The cytoplasm is enveloped by plasma membrane. Very small cortical granules are present under the plasma membrane.

A narrow perivitelline space is present outside the plasma membrane. Just outer to perivitelline space, there is thick non-cellular zona pellucida, secreted by follicular cells. Outer to the zona pellucida there is very thick cellular corona radiate.

The latter is formed of radially elongated follicular cells. The side of ovum which extrudes polar bodies is termed animal pole. The opposite side is called **vegetal** pole. Human ouvm loses its ability to be fertilized about 24 hours after ovulation. In human beings ovum is released from ovary as secondary oocyte

364 **(b)**

Parthenogenesis (Apomixis)

It is the development of a new individual from a single gamete (generally the egg/ovum) without involving fertilisation. On the basis of chromosomes sets, *parthenogenesis is of two types* (i) **Arrhenotoky** (haploid) parthenogenesis). Haploid eggs grow to form haploid males *e*. *g*., arachnids, some insects. (ii) **Thelytoky** (diploid parthenogenesis). Diploid eggs grow without fertilisation into diploid individuals, generally females *e*. *g*., Gall fly. Parthenogenesis can be natural or artificial. Natural parthenogenesis may be obligatory or cyclic.

Obligatory/Complete Parthenogenesis Males are absent. Females develop parthenogenesis, *e*. *g*., rotifers, *Typhlina brahmina* (small lizard, 15 cm long), *Lacerta saxicola armeniaca* (caucasian rock lizard), *Cnemidophorus* (whiptail lizards of America).

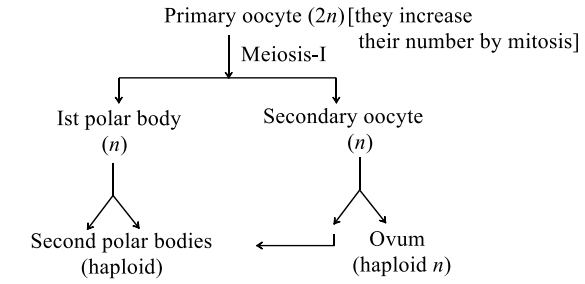
Cyclic/Incomplete Parthenogenesis Both sexual and parthenogenetic individuals occur. In aphids several generations of parthenogenetic females develop followed by formation of both male and females to perform sexual reproduction. In Turkey, 40% of the males develop parthenogenetically. In honeybee, male of drone develops parthenogenetically (no meiosis at the time of spermatogenesis) while queen and workers develop from fertilized eggs. Also in wasps and ants. In gall fly, larvae may lay eggs that develop parthenogenetically (paedogenesis)

365 **(c)**

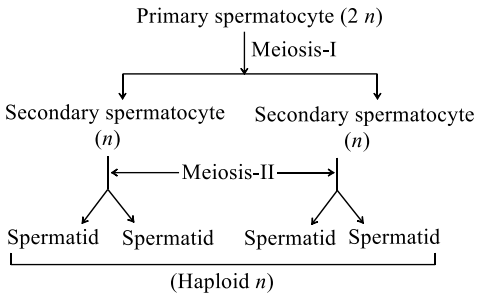
The vas deferens loops over urinary bladder, where it is joined by duct from seminal vesicle to form ejaculatory duct. Vasa deferentia carry sperms

366 **(d)**

Primary spermatocytes are diploid in number. Secondary (2°) spermatocytes and spermatids are haploid in number.



Schematic representation of oogenesis (2*n*) [they increse their number by mitosis]



Schematic representation of spermatogenesis

367 **(a)**

Acrosome is a cap-like structure surrounding the anterior end of the nucleus of a sperm. It is produced by the Golgi complex of spermatid. Acrosome of mammalian sperm produces sperm lysin called hyaluronidase.

368 **(d)**

Each lobule of testis contains two to three seminiferous tubules, blood vessels, nerves and connective tissue. Wall of each seminiferous tubule is formed of a single layered germinal epithelium. Majority of cells in this epithelium are cubical, however at certain places, there are present large pyramidal Sertoli or nurse cells. Sertoli cells nourish the developing sperms.

369 **(a)**

Gametes. *The major reproductive events in human beings are as follows*

(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)

(ii) **Insemination** It is the transfer of sperms by the male into the genital tract of the female

(iii) **Fertilization** Fusion of male and female gametes to form zygote is called fertilization

(iv) **Cleavage** It is rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst (blastula)

(v) **Implantation** It is the attachment of blastocyst to the uterine wall

(vi) **Placentation** It involves the formation of placenta which is the intimate connection between the foetus and uterine wall of the mother to exchange the materials

(vii) **Gastrulation** It is the process by which blastocyst is changed into gastrula with three primary germ layers

(viii) **Organogenesis** It is the formation of specific tissue, organs and organ systems from three primary germ layers

(ix) **Parturition** (child birth) it involves expelling of the baby from the mother's womb (uterus)

370 **(b)**

Liver and pancreas are originated from general endoderm.

371 **(c)**

Notochord, circulatory system, organs of urogenital system (including ureter, kidney, gonads, reproductive ductes); skeletal muscle, bone, cartilage of skeleton (except skull), dermis, connective tissues, etc are the derivatives of mesoderm.

372 **(b)**

Corpus luteum secretes progesterone harmone.

373 **(a)**

Differences between Leydig's cells and Sertoli cells

Leydig's Cells (Interstitial Cells)	**Sertoli Cells** (Sustentacular Cells)
They are present in between the seminiferous tubules.	They are present in between the germinal epithelial cells of the seminiferous tubules.
Leydig's cells are found in small groups and are rounded in shape.	Sertoli cells are found singly and are elongated
They secrete andogens (*e*. *g*., testosterone) male sex hormones	They provide nourishment to the developing spermatozoa (sperms). Sertoli cells secrete ABP (Androgen Binding Protein) that concentrates testosterone in the seminiferous tubules. It also secretes another protein inhibin which

	suppresses FSH synthesis

374 **(a)**
Menstrual cycle do not takes place regularly because of high levels of hormones in the blood

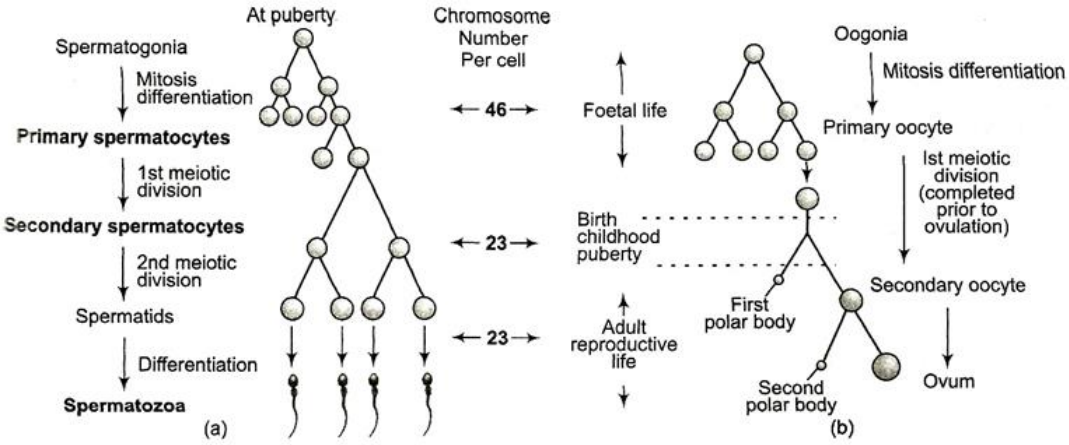
375 **(d)**
The wall of each seminiferous tubule of testicular lobule is formed of a single layered germinal epithelium. Large pyremidal Sertoli's cells secrete androgen binding protein that concentrates testosterone in the seminiferous tubule. These cells nourish the developing sperms.

376 **(a)**
Parthenogenesis is the development of an embryo from an unfertilized egg or if a spermatozoan does penetrate the egg, there is no union of male and female pronuclei.

377 **(b)**
Implantation
(i) Zygote divides rapidly by mitotic division. This is called cleavage. As a result 2, 4, 8, 16 daughter cells are produced which are termed as blastomeres
(ii) Embryo with 8-16 blastomeres is called a morula
(iii) The morula changes into a large mass of cells called blastocyst, which passes further into the uterus
(iv) Blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called inner cell mass
(v) The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo
(vi) The cells of endometrium divide rapidly and cover the blastocyst
(vii) So, the blastocyst gets embedded in the endometrium of the uterus. This is called implantation, which leads to pregnancy

378 **(b)**
In penetration, acrosome of sperm undergoes acrosomal reaction and releases certain sperm lysins, which dissolve the egg envelops locally and make the path for the penetration of sperm.

379 **(c)**
A-Spermatogonia, B-Primary spermatocytes, C-Secondary spermatocytes, D-Spermatids, E-Primary oocyte, F-Secondary oocyte, G-First polar body, H-Second polar body



Schematic representation of (a) Spermatogenesis (b) Oogenesis

380 **(d)**
In the ovulatory phase, production of FSH decreases, while that of LH increases it causes ovulation. The ovum is drawn into Fallopian tube

381 **(d)**
Nervous system originated from ectodermal layer.

382 **(c)**
A-Isthmus; B-Fimbriae; C-Ampulla

383 **(b)**
Bidder's canal is a part of urinogenital system of male frog. It is the longitudinal canal of kidney into which the collecting canals open and put the sperms received. Posteriorly, it continues into the ureter.

384 **(d)**
28 weeks.
Summary of important development changes in the human embryo

Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
Week 2	The three primary germ layers (ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing
Week 5	Brain developing, 'Limb buds', small swelling which are the beginning of the arms and legs. Heart is a large tube and starts to beat, pumping blood. This can be seen an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed. Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

386 **(b)**

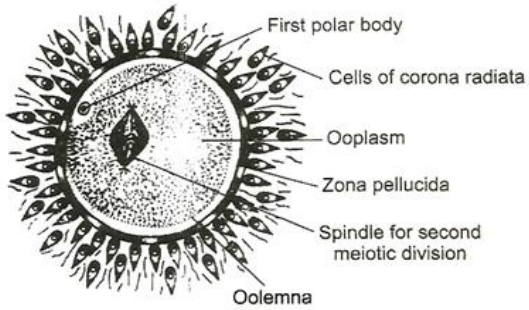
Mammalian egg has very small amount of yolk.

387 **(c)**

One ovum is produced from one germ cell of female gonad, whereas four sperms are produced from one germ cell of male gonad. Thus, the ratio of ova and sperms will be 1 : 4.

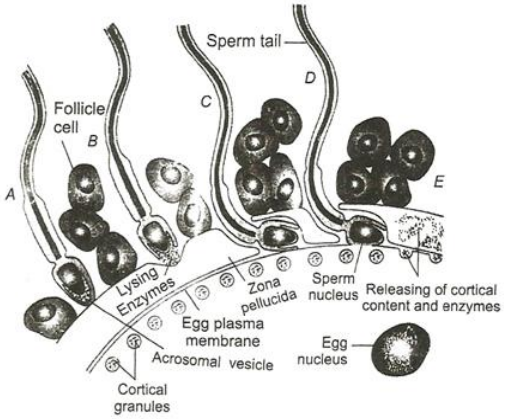
388 **(b)**

A-Corticle granules, B-Corticle enzyme, C-Plasma membrane, D-Monospermy. Ovum at the time of fertilization looks like



Structure of ovum at the time of fertilisation

Steps A, B, C and D can be seen as



A-Sperm passes through corona radiate, B-Acrosome reaction, releasing lysing enzyme, C-Sperm passes through pellucida and reaches oolemma. D-Sperm and egg plasma membranes fuse, enabling the sperm contents to enter egg. E-Cortical reaction, releasing enzymes to harden zona pellucida

389 **(a)**

The transformation of spermatids to sperm is known as spermiogenesis or spermateleosis.

390 **(a)**

Regeneration of tail in lizards is an example of epimorphosis. Epimorphosis takes place by the proliferation of the new tissue cell from the surface of wound.

391 **(d)**

Endometrium wall periodically change in menstrual cycle.

Generally, menstrual cycle have four phases

(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.

(b) The unfertilized egg and soft tissue are discharged.

(c) It lasts 3-5 days.

(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.

(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.

(c) It least for about 10-14 days.

(iii) **Ovulatory Phase** (a) Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).

(b) It lasts for only about 48 hr.

(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.

(b) The endometrium thickens further and their glands secrete a fluid into the uterus.

c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation.

(d) Oestrogen and progesterone levels rise during this phase. It lasts for only 1 day. (e) During pregnancy all events of the menstrual cycle stop and there is no menstruation. The menstrual cycle permanently stops in females at the age of around 50 years. This is called **menopause**

392 **(b)**

During spermatogenesis, at the end of first meiotic division, the male germ cells differentiate into the secondary spermatocytes.

393 **(b)**

The mode of cleavage is determined by the amount of yolk and its distribution.

394 **(c)**

In secretory phase during ovulation, the follicle breaks and collapse under the continuous influence of Luteinizing Hormone (LH). It begins to enlarge and forms a yellowish structure, called the **corpus luteum**. The corpus luteum plays an important role in the preparation of the endometrium for the implantation of the fertilized egg by secreting estrogens and progesterone.

395 **(b)**

Vasa deferentia emerges from the cauda epididymis on each side and leaves the scrotal sac and enters the abdominal cavity through inguinal canal. It is lined by many stereocilia to transport the sperms from testis to the outside through urethra

396 **(b)**

Myometrium is the middle thick layer of the uterus (the womb). By weight myometrium is the largest component of uterus wall.

Ovaries are the primary sex organ of Female Reproductive System that produces ova

↓

Female Reproductive System

↓

Fallopian tube or oviduct	Uterus (true womb)
(10-12 cm small tube laying at each side of the uterus It is divided into four parts.	Single, hollow, muscular pea-shaped structure, supported by ligaments and attached to pelvic wall. Wall a uterus contains three layer.

1. Infundibulum
It is the opening of fallopian tube found near to ovaries

2. Fimbriae
Finger like projection for collecting ovum near to ovaries

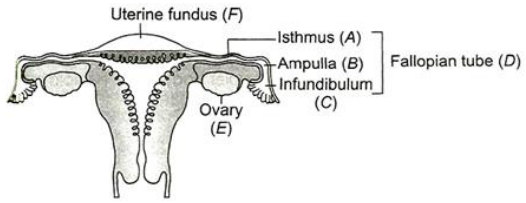
3. Ampulla
Infundibulum leads to the wider part of oviduct

4. Isthmus
Last part of oviduct having a narrow lumen which joins the uterus

1. **Perimetrium**
Outer thin covering of uterus wall

2. **Myometrium**
Middle thick layer or uterus wall

3. **Endometrium**
Inner layer of uterus that contains glands and many blood vesels



Female reproductive system

397 **(a)**
Nucleus and acrosome.
Structure of a sperm (spermatozoa) It consists of four parts *i.e.,* Head, Neck, Middle piece and tail, enveloped by a plasma membrane.
Head It is the enlarged end of a sperm, containing the large haploid nucleus, *i.e.,* condensed chromatin body and is capped by **acrosome**. The acrosome contains hydrolytic enzymes that help in dissolving membranes of the ovum for fertilization.
Neck It contains proximal centriole which is necessary for the first cleavage division of zygote and the distal centriole that is connected to the tail filament.
Middle piece It contains a number of mitochondria that provide energy for the movement of the tail that facilitate sperm motility essential or fertilization.
Tail It consists of axial filaments surrounded by the plasma membrane. It helps the sperms to swim in a fluid medium

398 **(d)**
The foetal part of the placenta in human is formed by the chorionic villi, which lie in the maternal blood pool, formed by the erosion of uterine endometrium and endothelial wall of uterine blood vessels to form the haemochorial placenta.

399 **(a)**
Oxytocin hormone is secreted from neurohypophysis of pituitary. It stimulates the contraction of the smooth muscles of uterus inducing labour pain for child birth.

400 **(a)**
Labium majora are two large thick folds of skin, which form the boundary of vulva. The labia majora are considered homologous to the scrotum of the male.

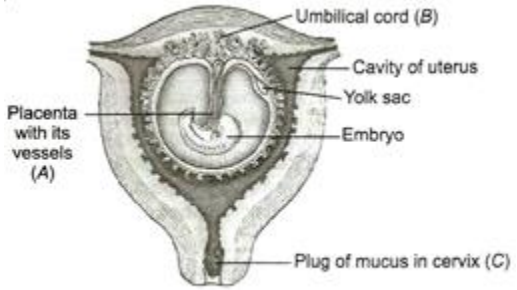
401 **(a)**
The transformation of spermatids into spermatozoa is called spermiogenesis or spermateliosis. The spermatids are later on known as sperms. After spermiogenesis head becomes embedded in the Sertoli cells and are finally released from the seminiferous tubules by process called spermiation

402 **(c)**
Amnion is an extra embryonic membrane that surrounds embryo in reptiles, birds and mammals. It provides a kind of private aquarium to the embryo and protects it from mechanical shock and desiccation

403 **(c)**
A – Primary spermatocytes
B – Secondary spermatocytes
C – Spermatozoa

404 **(b)**
After implantation, finger-like projections appear on the trophoblast called chorionic villi, which are surrounded by the uterine tissue and maternal blood. The chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit between

developing embryo (foetus) and maternal body called placenta



The human foetus within the uterus

405 **(b)**

Mucous (jelly –like) connective tissue is present mostly in embryos with Whartorn's jelly (highly gelatinous) as the ground substance. The tissue is common in umbilical cord, cock's comb and viterous body of eye ball.

406 **(a)**

The cervix is the part which joins the anterior wall of the vagina and opens into it. The cavity of the cervix is called cervix canal. The cervix communicates above with the body of the uterus by an aperture called internal os and with the vagina below by an opening the external os

407 **(d)**

Oogenesis or primordial follicles starts their development at the foetal stage but after birth this development stops and again resumes at the puberty stage

408 **(c)**

Due to changing of the membrane potential, there is depolarization and due to depolarization the entry of other sperms is blocked. This leads to the monospermy

409 **(b)**

In spermatogenesis, during growth phase some spermatogonia either due to growth or due to food storage become 2 or 3 times large of their original size and are known as primary spermatocytes, which undergo meiosis-I and as a result 2 haploid secondary spermatocytes are formed.

Futher, meiosis-II takes place that results in the foramtion of 4-spermatids. Then, these round, non-motile and haploid spermatids are transformed into thread-like motile, haploid (four) sperms.

410 **(c)**

Karyogamy and amphimixis are the same terms. Mixing up of chromosomes of male and female nucleus is called karyogamy or amphimixis

411 **(d)**

6th month.

Summary of important development changes in the human embryo

Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
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By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

412 **(a)**

Menstruation occurs in human, apes and old world monkeys. Menstruation is bleeding from uterus of adult female at intervals of one lunar month. A reduction in oestrogens and progesterone causes menstruation. Gonadotropin releasing hormone secreted by the hypothalamus stimulates the release of FSH and LH. FSH and LH stimulate the ovarian follicles to produce more oestrogens during proliferative phase of menstrual cycle. Growth hormone (GH) has no role in the process of menstrual cycle.

413 **(b)**

In a 28 day menstrual cycle, the menses takes place. For 3-5 days, the production of LH from the anterior lobe of the pituitary gland considerably reduced. The withdrawal of this hormone causes degeneration of the corpus luteum and therefore, progesterone production is reduced. Production of oestrogen also reduced in this phase (menstrual). The endometrium of the uterus breaks down and menstruation begins. The cells of endometrium secretions and the unfertilized ovum constitute the menstrual flow

414 **(d)**

A-FSH; B-Oestrogen

415 **(a)**

Fertilisin antifertilisin interaction was proposed by **IR Lillie**. According to this theory, ovum secretes fertilisin (composed of glycoprotein = monosaccharide + Amino acid) and sperm release antifertilisin (composed of acidic amino acid). They interact with each other and they are species specific. The adhesion of sperm to the egg of the same species through chemical recognition is known as agglutination

416 **(b)**

Clitoris is considered as rudimentary organ in female external genitalia and considered as homologous to penis

417 **(a)**

Ectoderm.

Fate of three germ layers

Mesoderm Dermis of skin, circulatory system, muscles, bones (except facial)

Endoderm Lining of Gl tract, lining of lungs, kidney ducts and bladder, thymus, thyroid tonsils

Ectoderm Epidermis of skin, tooth enamel, lens and cornea of the eye outer ear Brain and spinal cord, facial bones skeletal muscles in the head

All bones are derived from the mesoderm but only facial bones which are derived from the ectoderm

418 **(b)**

When the regeneration is limited to the repair or healing of wounds, it is called **reparative regeneration**. It takes place by localized cell proliferation and migration, *e.g.,* healing of bone fracture, regeneration of liver (compensatory regeneration).

419 **(a)**

Embryologist can draw the fate maps of future organ of embryo in blastula stage using natural colour patten or vital dyes to show the fate of various germ layers.

420 **(c)**

Pseudocoelom is a persisted blastocoel. It lacks definite mesoderm lining.

421 **(b)**
Fallopian tube or oviduct is the site of fertilization in mammals. The embryo develops upto blastocyst stage in fallopian tube.

422 **(a)**
Bulbourethral gland secretes mucus, which lubricate penis during intercourse. This reduces the friction during the process. Bulbourethral gland is also called Cowper's gland

423 **(d)**
A- Antrum, B- Secondary follicle, C-Tertiary follicle

424 **(d)**
The process of formation of spermatozoa from spermatids is called spermiogenesis.

425 **(a)**
Each human testis is oval in shape with a length of about 4 to 5 cm and a width of about 2 to 3 cm

426 **(a)**
ER is absent in human sperm.

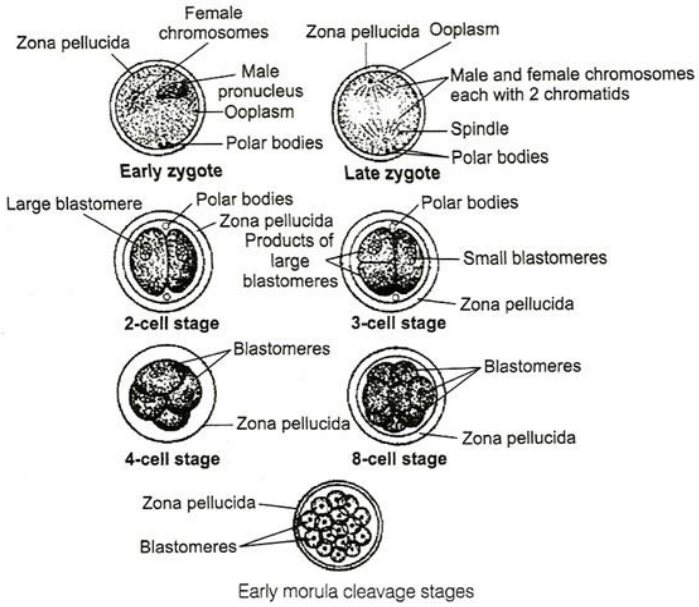
427 **(b)**
Largest egg is of ostrich.

428 **(c)**
The wall of uterus is composed of three layers of tissues-the perimetrium (outer covering), the myometrium (middle layer of smooth muscle fibre) and endometrium (the mucus membrane lining).

429 **(a)**
The head of sperm is composed of two regions, *i.e*, nuclear region and an acrosomal region. Acrosomal regions contains the acrosome, a large lysosome possessing hydrolytic enzymes which help in the penetration of the layers of cells surrounding the egg immediately before fertilization.

430 **(a)**
Bartholin's gland in female is the counterpart of Cowper's gland in male. The secretion of this gland is thick, viscid and alaline for lubrication during copulation and counteracting urinary acidity.

431 **(a)**
Embryo at 8 to 16 stages is called morula stage of embryo



Early morula cleavage stages

432 **(d)**
Neoteny is the retention of larval or embryonic characters even after sexual maturity. It is shown by **Axolotl larva** or *Ambystoma* (tiger salamander) found in USA and Mexico.

433 **(a)**
Implantation is the attachment of blastocytes to the uterine wall.

Gametes. *The major reproductive events in human beings are as follows*
(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)
(ii) **Insemination** It is the transfer of sperms by the male into the genital tract of the female
(iii) **Fertilization** Fusion of male and female gametes to form zygote is called fertilization

(iv) **Cleavage** It is rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst (blastula)
(v) **Implantation** It is the attachment of blastocyst to the uterine wall
(vi) **Placentation** It involves the formation of placenta which is the intimate connection between the foetus and uterine wall of the mother to exchange the materials
(vii) **Gastrulation** It is the process by which blastocyst is changed into gastrula with three primary germ layers
(viii) **Organogenesis** It is the formation of specific tissue, organs and organ systems from three primary germ layers
(ix) **Parturition** (child birth) it involves expelling of the baby from the mother's womb (uterus)

434 **(c)**
The female individual contains two X chromosomes. The eggs are produced by the meiosis, *i.e.,* reduction division. So, the egg contains one X-chromosome, when released from ovary. After fertilization, the diploid phase is restrored.

435 **(d)**
Acrosome is a part of human sperm.

436 **(b)**
If testes are removed before maturity, the secondary sexual characteristics will not develop due to absence of male hormone testoterone. Such a condition is known as **eunuchoidism**.

437 **(a)**
Acrosome contains hyaluronidase proteolytic enzymes, which is popularly known as sperm lysin as it is used to penetrate egg (ovum) at the time of fertilisaton

438 **(c)**
Placenta is an organic connection between the foetus and uterine wall for physiological exchange between foetus and mothers blood. The placenta develops at the point of implantation.
Extraembryonic membrane, *i.e.*, amnion, allantois, chorion and yolk sac are formed from trophoblast (the ring of cells surrounding the inner cell mass in a developing pro-embryo). Chorion is formed of ectoderm externally and mesoderm inside. Along with allantois, it participates in formation of placenta.

439 **(d)**
Cleavage divisions are mitotic division, in which the single celled zygote is connected into a multicellular morula. But during cleavage division, there is no growth of resultant daughter cell/blastomeres. So, the DNA content will increase, but there is no increase or insignificant increase in amount of protoplasm.

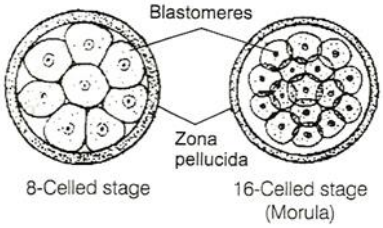
440 **(a)**
Development periods It includes embryonic or prenatal and post embryonic or postnatal (natal concerning birth)
(i) Embryonic period (prenatal period) In human beings is passed in mother's womb (uterus). It includes the events from the formation of an embryo till the time of birth
(ii) Post embryonic period (postnatal period). This period is passed outside the mother's womb. It includes events from birth to the death

441 **(a)**
Scrotum maintains the temperature of testis, which is 2-2.5°C below the body temperature. In winter they reduces their surface area for preventing heat loss, so that temperature remains 34.5-35°C. In summer it increase their surface area for cooling, so that the temperature remains 34.5-35°C

442 **(b)**
During fertilization, sperm enters from animal pole in unfertilized egg.

443 **(b)**
Blastocyst secretes a hormone called human chorionic gonadotropin (hCG), which maintains the corpus luteum in the ovary.

444 **(c)**
The embryo with 8 to 10 blastomeres is called morula



445 **(d)**
Oviduct (Fallopian tube) consists of urerine part, isthmus, the ampulla and the infundibulum. The

functions of fallopian tube is to convey ovum from ovary to uterus. Fertilization of ovum generally takes place in the upper portion of fallopian tube.

446 **(a)**

S. No.	Cell type	Nature of Cell Type
1.	Spermatozoon	Haploid ($1n$)
2.	Secondary Spermatocytes	Diploid ($2n$)
3.	Spermatogonium	Diploid ($2n$)
4.	Spermatid	Haploid ($2n$)
5.	Primary spermatocytes	Diploid ($2n$)
6.	Secondary oocyte	Haploid ($1n$)
7.	Second polar body	Haploid ($1n$)
8.	First polar body	Haploid ($1n$)
9.	Primary oocyte	Diploid ($2n$)

447 **(b)**

The distal centriole of the sperm divides and forms two centrioles to generate the mitotic spindle formation for cell division. The mammalian secondary oocyte (egg) does not have centriole of its own

448 **(d)**

Cone of reception. The secondary oocyte forms a projection termed as the cone of reception or fertilization cone, which receives the sperm

449 **(c)**

Sperm lysin is found in head region of sperm Acrosome contains hyaluronidase proteolytic enzymes, which is popularly known as sperm lysin as it is used to penetrate egg (ovum) at the time of fertilisaton

451 **(c)**

The oviducts (Fallopain tubes), uterus, vagina constitute the female accessory ducts. Each Fallopian tube is about 10-12 cm long and extends from periphery of each ovary to the uterus

452 **(a)**

A- Plasma membrane, B-Acrosome, C-Mitochondria.

Structure of a sperm (spermatozoa) It consists of four parts *i.e.,* Head, Neck, Middle piece and tail, enveloped by a plasma membrane.

Head It is the enlarged end of a sperm, containing the large haploid nucleus, *i.e.,* condensed chromatin body and is capped by **acrosome**. The acrosome contains hydrolytic enzymes that help in dissolving membranes of the ovum for fertilization.

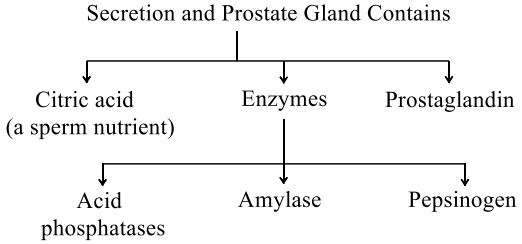
Neck It contains proximal centriole which is necessary for the first cleavage division of zygote and the distal centriole that is connected to the tail filament.

Middle piece It contains a number of mitochondria that provide energy for the movement of the tail that facilitate sperm motility essential or fertilization.

Tail It consists of axial filaments surrounded by the plasma membrane. It helps the sperms to swim in a fluid medium

453 **(c)**

Prostate gland's secretions constitute 25% volume of semen



454 **(a)**

Corpus luteum acts as a temporary endocrine gland, It secretes progesterone and relaxin. Progesterone is essential for promoting secretory changes in uterine endometrium (prepares uterus for implantation of fertilized ovum) and inhibits ovulation and menstrual cycle during pregnancy.)

455 **(d)**

As a result of gastrulation, ectoderm, mesoderm and endoderm are formed.

456 **(d)**

Amniocentesis is a technique for the diagnosis of congenital abnormalities before birth. By karyotypic studied of somatic cells, abnormalities due to changes in chromosome number like Down's syndrome. Turner's syndrome, Klinefelter's syndrome, etc, can be determined.

457 **(a)**

Epidermis, including glands, hair, nails, etc is ectodermal in origin. Notochord and muscles are mesodermal in origin. Dermis of skin is also mesodermal. Enamel of teeth is ectodermal in origin.

458 **(a)**

6-13 days.

Menstrual cycle

Phases	Days	Events

Menstrual phase	1-5	Endometrium breaks down, menstruation begins. The cells of endometrium, secretions, blood and the unfertilized ovum constitute the menstrual flow. Progesterone and LH production is reduced
Follicular phase (proliferative phase)	6-13	Endometrium rebuilds, FSH secretion and oestrogen's secretion increase
Ovulatory phase	14	Both LH and FSH attain a peak level. Concentration of oestrogen in the blood is also high and reaches its peak, Ovulation occurs
Luteal phase (secretory phase)	15-28	Corpus luteum secretes progesterone. Endometrium thickens and uterine glands become secretory

459 **(a)**

Oviduct has four regions, infundibulum, ampulla, isthmus, and uterine part. Ampulla is the long, wide, thin walled major part of the fallopian tube or oviduct. It lies next to the infundibulum and is a site for fertilization.

460 **(d)**

Greater vestibular glands (Bartholin's gland) are packed glands situated on each side of vaginal orifice. These glands are homologous to male bulbourethral (Cowper's) gland and secretes viscus fluid that supplements the lubrication during sexual intercourse.

The lesser vestibular glands (paraurethral glands or glands of Skene) are numerous minute glands that are present on either side of the urethral orifice (opening). These glands are homologous to the male prostate glands and secrete mucus

461 **(a)**

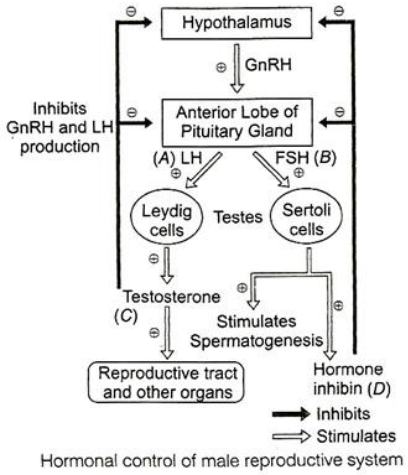
A-Primary sex organs; B-Secondary sex organs

462 **(b)**

Sertoli's cells are found in human testes, also called nurse cells. These are supportive nutritive cells and secrete a polypeptide hormone called inhibin and a steroid oestradiol which interferes with spermatogenic activity and kinetics of sperm production.

463 **(c)**

GnRH is secreted by the hypothalamus. It stimulates the anterior lobe of the pituitary gland to secrete LH and FSH. In male LH is known as Interstitial Cells Stimulating Hormone (ICSH) because it stimulates interstitial cells (Leydig's cells) of the testes to secrete androgens. Testosterone is the principal androgen. FSH stimulates Sertoli cells of the testes to secrete an Androgen Binding Protein (ABP) that concentrates testosterone in the seminiferous tubules. Sertoli cells also secretes a protein hormone called inhibin, which suppresses FSH synthesis. FSH acts directly on spermatogonia to stimulate sperm production



Hormonal control of male reproductive system

464 **(a)**

Sertoli's cells are located in the seminiferous tubules, the structural and functional units of testes. These cells are also called nurse cells as these provide nourishment for differentiating spermatozoa (developing sperm).

465 **(c)**

Follicle Stimulating Hormone (FSH), Luteinzing Hormone (LH) and oestrogen, all play an

important role in controlling the menstrual cycle in human females.

466 **(a)**

Parturition

(i) The average duration of human pregnancy is about 9 months which is called the gestation period

(ii) The act of expelling the full term foetus from the mother's uterus at the end of gestation period is called parturition

(iii) It is induced by a complex neuroendocrine mechanism

(iv) Parturition signals originates from the fully developed foetus and the palcenta, which induce mild uterine contractions called foetus ejection reflex

(v) This triggers the release of oxytocin from the maternal pituitary

(vi) Oxytocin induces stronger uterine muscle contractions

(vii) Relaxin increases the flexibility of the pubic symphysis and ligaments that helps to dilate the uterine cervix during labour pain

(viii) This leads to the expulsion of baby

467 **(c)**

Placentation is a connection between foetus and uterine wall.

Gametes. *The major reproductive events in human beings are as follows*

(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)

(ii) **Insemination** It is the transfer of sperms by the male into the genital tract of the female

(iii) **Fertilization** Fusion of male and female gametes to form zygote is called fertilization

(iv) **Cleavage** It is rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst (blastula)

(v) **Implantation** It is the attachment of blastocyst to the uterine wall

(vi) **Placentation** It involves the formation of placenta which is the intimate connection between the foetus and uterine wall of the mother to exchange the materials

(vii) **Gastrulation** It is the process by which blastocyst is changed into gastrula with three primary germ layers

(viii) **Organogenesis** It is the formation of specific tissue, organs and organ systems from three primary germ layers

(ix) **Parturition** (child birth) it involves expelling of the baby from the mother's womb (uterus)

468 **(b)**

Corpus luteum secretes the hormone progesterone, which prepares and maintains the uterus during pregnancy.

469 **(b)**

All the chordates (including humans) at some stages of their life cycle, contain a series of paired lateral gills clefts or **gill slits**. These are finger like, hollow pouches that grow out from pharyngeal wall and meet with corresponding inpocketing of body wall. In lower chordates, gill clefts serve as respiratory organs but in higher chordates, these are present only during embryonic development.

470 **(c)**

Endoderm.

Fate of three germ layers

Mesoderm Dermis of skin, circulatory system, muscles, bones (except facial)

Endoderm Lining of Gl tract, lining of lungs, kidney ducts and bladder, thymus, thyroid tonsils

Ectoderm Epidermis of skin, tooth enamel, lens and cornea of the eye outer ear Brain and spinal cord, facial bones skeletal muscles in the head

471 **(d)**

To control the human population, many birth control methods can be used, such as hormonal method, *i.e.,* use of contraceptive pills (oestrogen and progesterone are main constituents), mechanical prevention method *i.e.,* use of IUCDs (Intra Uterine Contraceptive Devices), surgical sterilization methods, like tubectomy (surgical removal of fallopian tubules) or vasectomy (surgical removal of vas deferens).

472 **(a)**

Oogenesis is the process of formation of mature ovum. *It has three phases*

(a) **Multiplication Phase** Oogenesis takes place in embryo stage. A couple of million of gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed after birth. These cells (oogonia) get into prophase-I of meiotic division. They get temporarily arrested as this stage called primary oocyte

(b) **Growth Phase** Each primary oocyte then gets surrounded by a layer of granulosa cells. This structure is called the primary follicle. A large number of these follicles degenerate during the phase from birth to puberty. At puberty, only 60000 and 80000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca to form secondary follicles

(c) **Maturation Phase** In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large haploid secondary oocyte and a tiny first polar body

The tertiary follicle changes into a mature follicle-the Graafian follicle which ruptures to release the secondary oocyte (ovum) from the ovary by a process called ovulation. The second maturation phase occurs after fertilization when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid)

473 **(d)**

Menarche.

Menstrual Cycle

(i) The rhythmic series of changes that occurs in the reproductive organs of female primates (monkeys, apes and human beings) is called menstrual cycle.

(ii) It is repeated at an average interval of about 28/29 days.

The first appearance of menstruation at puberty is called menarche

474 **(d)**

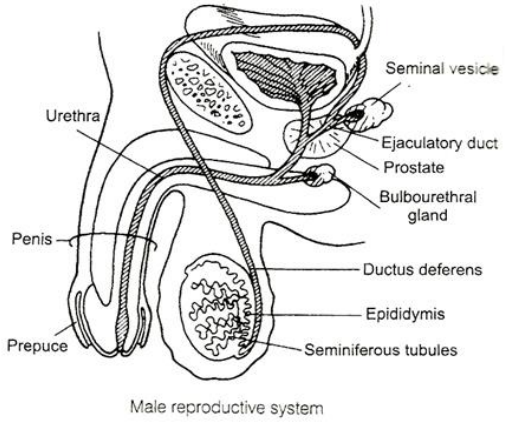
Antrum is the fluid filled cavity which is formed only in secondary follicle or Graafian follicle

475 **(b)**

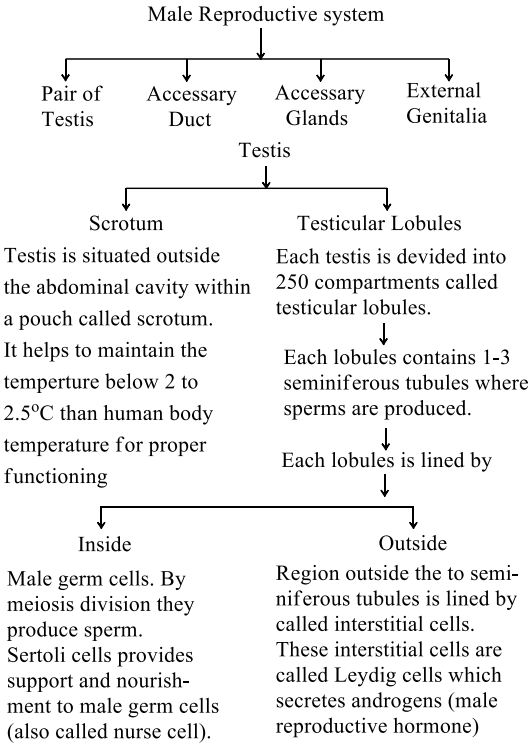
Trophoblast, inner cell, endometrium, inner mass cell, blastocyst, implantation

476 **(c)**

Inner portion of seminiferous tubules is lined by male germ cells and Sertoli cells



Male reproductive system



477 **(c)**

A-vas deferens; B-urinary bladder

478 **(a)**

Chorion is made up of trophoblast outer and somato pleutronic inside

Extraembryonic or Foetal Membranes

The growing embryo/foetus develops four membranes called the extraembryoic or foetal membranes. These include chorion, aminion, allantois and yolk sac

(i) **Chorion** It is made up of trophoblast outside and somatopleuric extraembryonic mesoderm inside. It completely surrounds the embryo and protects it. It also takes part in the formation of placenta

(ii) **Amnion** It is composed of trophoblast inside and somatopleuric extraembryonic mesoderm outside. The space between the embryo and the amnion is called the amniotic cavity, which is filled with a clear, watery fluid secreted by both

the embryo and the membrane. The amniotic fluid prevents dessication of the embryo and acts as a protective cushion that absorbs shocks

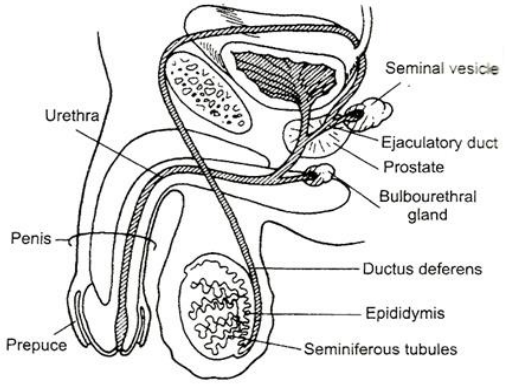
(iii) **Allantois** The allantois is composed of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. It is a sac like structure, which arises from the gut of the embryo near the yolk sac. In human the allantois is small and non-functional except for furnishing blood vessels to the placenta

(iv) **Yolk Sac** The primary yolk sac consists of endoderm inside and splanchnopleuric extraembryoic mesoderm outside. The yolk sac is non-functional in human beings except that it functions as the site of early blood cell formation

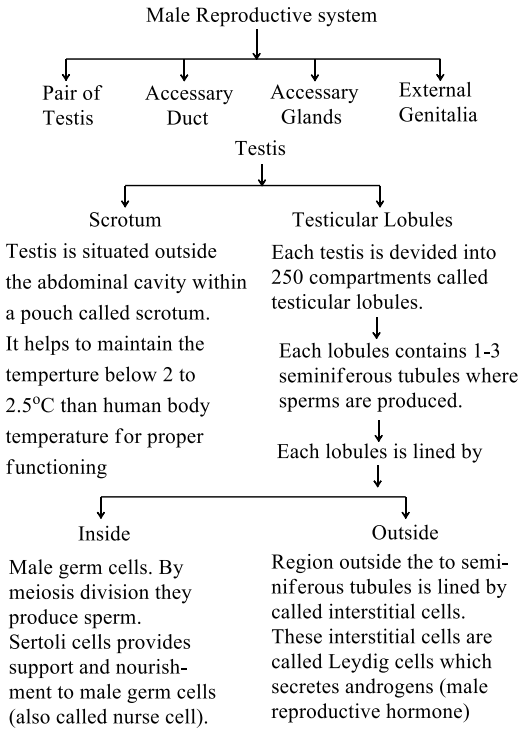
479 **(d)**

Interstitial or Leydig cells.

Region outside the seminiferous tubules is called interdigital space, which is lined by interstitial cells also called Leydig cells. Leydig cells secretes testosterone and also called endocrine part of the testis



Male reproductive system



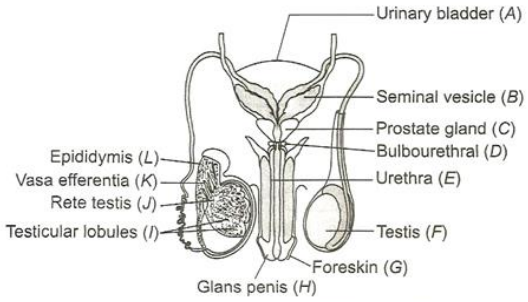
481 **(c)**

Somatic mutation theory is a part of damage or error theories regarding the cause of ageing. It advocates that genetic mutations occur and accumulate with increasing age, causing cell to deteriorate and malfunction.

482 **(d)**

I-Testicular lobules, J-Rete-testis, K-Vasa efferentia, L-Epididymis.

Male reproductive system is made up of a pair of testis, scrotum, vasa efferentia, a pair of epididymis, a pair of vasa deferentia, a pair of seminal vesicles, a pair of ejaculatory ducts, urethra, prostate gland, a pair of Cowper's gland and penis



Diagrammatic view of male reproductive system

483 **(b)**

During development of the foetus in human by week 20, hair begin to grow including eyebrows and eyelashes. Fingerprints develop. Fingernails and toe nails grow. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time.

484 **(b)**

Germ cell is immortal.

485 **(b)**

A-Mons pubis, B-Labia majora, C-Glans clitoris, D-Labia minora, E-Urethra, F-Vagina, G-Anus

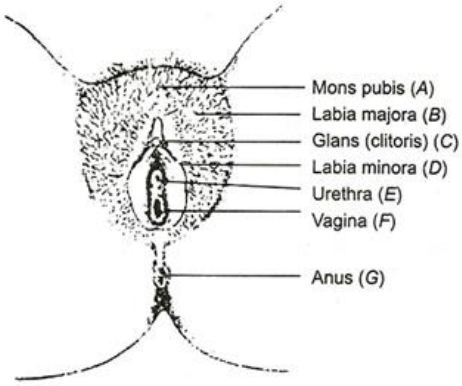
External genitalia (vulva) of female has following parts

(i) **Mons Pubis** It is the anteriormost portion of the external genitalia which is covered by the skin and pubic hairs. It acts as a cushion during intercourse

(ii) **Labia Majora** These are fleshy folds of tissue which extend down from the mons pubis and surrounds the vaginal opening

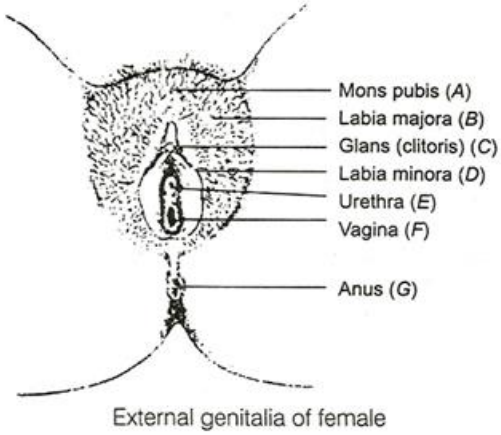
(iii) **Labia Minora** These are paired folds of tissue under the labia majora

(iv) **Hymen** The opening of vagina covered partially by a membrane called hymen



External genitalia of female

(v) **Clitoris** is a tiny finger-like structure which lies at the upper junction of the two labia minora above urethral opening



External genitalia of female

486 **(b)**

Ejaculation or seminal emission is the foreceful expulsion of semen during sexual intercourse. At an average ejaculation, 3mL of semen contain about 300 million spermatozoa.

487 **(d)**

Human Placental Lactogen (HPL) causes production of milk in mammary glands, oxytocin initiates milk flow and prolactin regulates milk flow. The first milk produced after child birth is called colostrum and is very nutritious.

488 **(c)**

The acrosome of sperm contains lytic enzymes such as cathepsin, acid phosphatase, hyaluronidase, proacrosin. Hyaluronidase enzyme is found particularly in the sperms of mammals. This enzyme dissolves corona radiata enables the sperm to penetrate through it. Proacrosin changes into acrosin and helps to dissolve the zona pellucida layer of the ovum.

489 **(c)**

Either (a) or (b).

Blastocyst Formation At the next stage of development (morula), which produces an embryo with about 64 cells, a cavity is formed with in the cell mass. This cavity is called blastocyst cavity (blastocoel) and the embryo is termed as blastocyst.

Blastocyst composed of an outer envelops of cells the trophoblast or trophoectoderm and inner mass cell (embryoblast). The side of the blastocyst to which inner mass cell is attached is called embryonic pole (animal pole), while opposite side is the abembryonic pole

490 **(b)**

Ageing is retarded by CKN (cytokinins).

491 **(a)**

The entire bone marrow in young ones is red and it actively synthesizes RBCs. But it gradually begin to change in yellow bone marrow at about 5 years of age.

492 **(d)**

In rabbit head of epididymis present at the head of the testis is called caput epidiymis.

493 **(a)**

The glandular tissue comprises about 15-20 lobes in each breast. Each lobe is made up of number of lobules.

Each lobule is composed of grape like cluster of milk secreting glands termed as alveoli. When milk is produced, it passes from alveoli into **mammary lobules** and into the mammary ducts

494 **(d)**

Placenta is the intimate connection between foetus and uterine wall of the mother to exchange

material. Placenta performs (i) Nutrition (ii) Respiration (iii) Excretion (iv) Storage (v) Endocrine part of embryo

495 **(a)**

By meiotic division, a diploid **spermatogonium** produces four haploid **spermatids,** these spermatids cannot act directly as the gametes or sperms so, each spermatid first passes to a prosess known as spermiogenesis and then produces four sperms or gametes.

496 **(b)**

In mesolecithal eggs, moderate amount of yolk is present. Cleavage found in mesolecithal eggs are holoblastic and unequal, e.g., frog, *Petromyzon*, etc.

497 **(d)**

A - Interstitial cell B - Spermatogonium

C – Spermatid D – Spermatozoa

E - Sertoli'scells

498 **(b)**

The male reproductive system, prostate gland is a single, large gland. It is situated around the first part of the urethra. It secretes a thin, milky fluid that contains calcium, citrate ion, phosphate ion, a clotting enzyme and a profibrinolysin.

499 **(d)**

The part of the fallopian tubes (oviducts) closer to the ovary is the funnel-shaped infundibulum. The edges of the infundibulum possess finger-like projections called **fimbriate**, which help in collection of the ovum after ovulation.

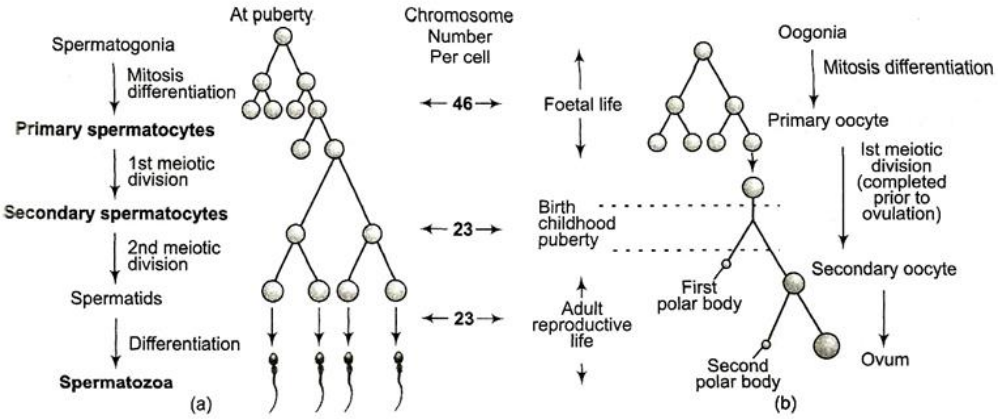
500 **(c)**

In the neck of human sperm there are pair of centriole. They also eter with nucleus in the ovum. Rest of sperm left behind. The first division in zygote takes place due to that centrioles. They form spindle fibre for first cell division

501 **(a)**

Foetal ejection reflex

502 **(d)**



Schematic representation of (a) Spermatogenesis (b) Oogenesis

A-Blood vessels
B-Primary follicles
C-Tertiary follicles showing antrum
D-Graafian follicles
E-Ovum
F-Corpus luteum

Ovary is internally differentiated into four parts, *i.e.,* outer **germinal epithelium** of cubical cells, a delicate sheath of connective tissue or **tunica albuginea**, a cortex of dense connective tissue with reticular fibres, spindle-shaped cells, ovarian follicles and a few blood vessels while the central part of **medulla** is made of less dense connective tissue with elastic fibres, smooth muscles, a number of blood vessels and a few nerves.

Maturation of secondary oocyte is completed in mother's oviduct after the sperm entry into it for fertilization. 2° oocyte stops advancing further after the completion of metaphase-II. Sperm entry restart the cell cycle by breaking down MPF (Maturation Promoting Factor) and truning on APF (Anaphase Promoting Factor)

503 **(c)**
Corpus luteum (yellow body) is fromed from ruptured Graafian follicle.

504 **(c)**
Prolactin is a protein-gonadotrophic hormone secreted by the vertebrate anterior pituitary gland. In mammals, it promotes secretion of progesterone by the corpus luteum and is involved in milk secretion (lactation).

505 **(d)**
According to some embryologists, the hypoblast is termed the embryonic **endoderm**, the first germ layer to be formed. Some workers called epiblast as ectoderm, the second germ layer.

506 **(a)**
Menstrual Cycle
(i) The rhythmic series of changes that occurs in the reproductive organs of female primates (monkeys, apes and human beings) is called menstrual cycle.
(ii) It is repeated at an average interval of about 28/29 days.
The first appearance of menstruation at puberty is called menarche

507 **(b)**
At the time of fertilization, the sperm secretes **sperm lysin** and **anti-fertilizin**.

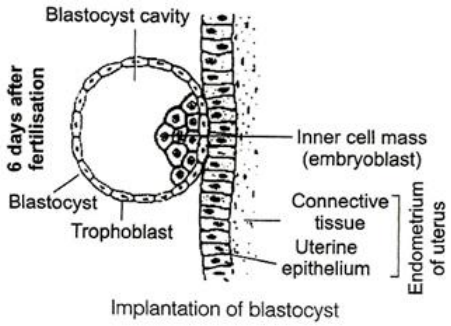
508 **(b)**
Seminal vesicle secretes seminal fluid containing fructose and prostaglandins. Polar bodies are formed by meiosis-I and meiosis-II before and after fertilisation respectively. Polar bodies serves both as dumping ground for extra sets of chromosomes and ensures that the ovum will have most of the cytoplasm

509 **(c)**
Brain is ectodermal in origin. Notochord and kidney are mesodermal, whereas liver is endodermal in origin.

510 **(a)**
Contraception pills for women contain female sex hormones oestrogen and progesterone.

511 **(c)**
There are eight charcteristic activites common to all organisms, respiration, nutrition, metabolism, excretion, sensitivity, locomotion, reproduction and growth. The possession and practice of these characteristic activities of organisms is the way biologists identify and define life.

512 **(b)**
The trophoblast encircles the blastocoel and inner mass cell. The inner mass cell is the precursor of the embryo. It means that inner mass give rise to embryo. The cells of the trophoblast helps to provide the nutrition to the embryo. The cells of the trophoblast form extra embryonic membranes namely chorion and amnion. The cells of the trophoblast which are in contact with inner mass are called cells of raubers



Implantation of blastocyst

513 **(c)**
3rd month.
Summary of important development changes in the human embryo

Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantataion 6-9 days after fertilisation
Week 2	The three primary germ layers (ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing

Week 5	Brain developing, 'Limb buds', small swelling which are the beginning of the arms and legs. Heart is a large tube and starts to beat, pumping blood. This can be seen an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed. Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

514 **(a)**

There are about 250 compartments in human testis called testicular lobules

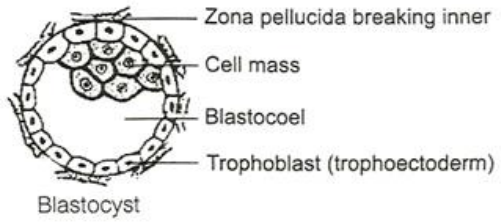
515 **(d)**

Hyaluronidase enzyme facilitates the entry of spermatozoa.

516 **(a)**

Biological process of ageing is higher in human males than in females. Thus, dead space is highest in old men.

517 **(a)**



Blastocyst Formation At the next stage of development (morula), which produces an embryo with about 64 cells, a cavity is formed with in the cell mass. This cavity is called blastocyst cavity (blastocoel) and the embryo is termed as blastocyst.

Blastocyst composed of an outer envelops of cells the trophoblast or trophoectoderm and inner mass cell (embryoblast). The side of the blastocyst to which inner mass cell is attached is called embryonic pole (animal pole), while opposite side is the abembryonic pole

520 **(a)**

The male humans, if testes fail to descend into the scrotal sac, it is called **cryptorchidism.**

521 **(c)**

LH and FSH both are present in follicular phase but LH's high concentration is seen in ovulatory phase.

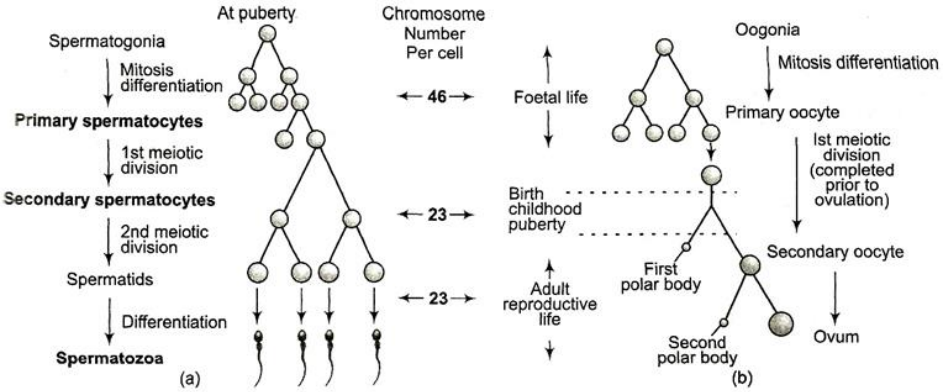
Menstrual cycle

Phases	Days	Events
Menstrual phase	1-5	Endometrium breaks down, menstruation begins. The cells of endometrium, secretions, blood and the unfertilized ovum constitute the menstrual flow. Progesterone and LH production is reduced
Follicular phase	6-13	Endometrium rebuilds, FSH secretion and

(proliferative phase)		oestrogen's secretion increase
Ovulatory phase	14	Both LH and FSH attain a peak level. Concentration of oestrogen in the blood is also high and reaches its peak, Ovulation occurs
Luteal phase (secretory phase)	15-28	Corpus luteum secretes progesterone. Endometrium thickens and uterine glands become secretory

522 **(b)**

46, 46, 23



Schematic representation of (a) Spermatogenesis (b) Oogenesis

A-Oogonia-46 chromosomes, B-Primary oocyte-46 chromosomes, C-Secondary oocyte-23 chromosomes

523 **(d)**

In the male, ICSH stimulates the interstitial cells or Leydig's cells in testis to develop and secrete large amount of testosterone.

524 **(c)**

Implantation is the attachment of the blastocyst to the uterine wall. It access after the seven days of fertilisation

525 **(a)**

Region outside the seminiferous tubules is called interdigital space, which is lined by interstitial cells also called Leydig cells. Leydig cells secretes testosterone and also called endocrine part of the testis

526 **(c)**

Oxytocin hormone is secreted by posterior pituitary gland. It helps in ejection of milk from mother's breasts, when the baby is sucking.

527 **(b)**

The penis contains three cylindrical masses of erectile tissues – two dorsal corpora cavernosa (which run parallel on the dorsal part) and a central corpus spongiosum (which contain urethra).

528 **(b)**

Undifferentiated primordial germ cells undergo mitotic division to produce spermatogonia. Each spermatogonium grows to a large primary spermatocyte by obtaining nutrients from the nursing cells. The DNA content remains same $(2n)$ in both spermatogonia and primary spermatocyte.

529 **(b)**

During ovulation the oestrogen level do not remain the low.

Generally, menstrual cycle have four phases

(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.

(b) The unfertilized egg and soft tissue are discharged.

(c) It lasts 3-5 days.

(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.

(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.

(c) It least for about 10-14 days.

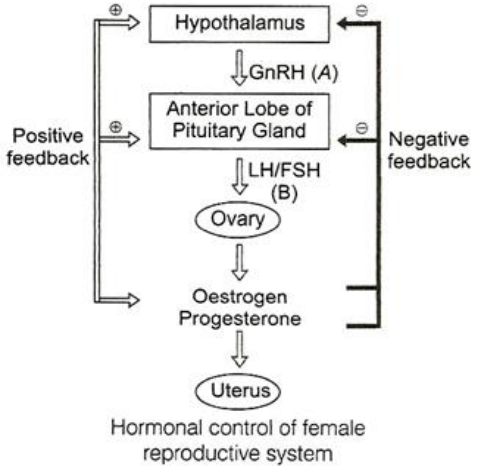
(iii) **Ovulatory Phase** (a) Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).
(b) It lasts for only about 48 hr.
(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation.
(d) Oestrogen and progesterone levels rise during this phase. It lasts for only 1 day. (e) During pregnancy all events of the menstrual cycle stop and there is no menstruation. The menstrual cycle permanently stops in females at the age of around 50 years. This is called **menopause**

530 **(b)**
All the three germ layer (ectoderm, endoderm, mesoderm) are originated form inner cell mass

531 **(b)**
Spermatogenesis is the formation of sperm from a germ cell. Four spermatozoa are produced from a primary spermatocyte therefore, 16 spermatozoa will be formed from four primary spermatocytes.

532 **(a)**
Stem cells are the cells, which can give rise to any type of cell. They are also called totipotent cells. They (stem cells) are found more abundantly in plants than animals

533 **(d)**
The GnRH is secreted by hypothalamus which stimulates the anterior lobe of pituitary gland to secretes LH and FSH. FSH, stimulates the growth of the ovarian follicles and also increases the development of egg/oocytes within the follicle to complete the meiosis-I to form secondary oocyte. FSH also stimulates the formation of oestrogens. LH stimulates the corpus lutem to secretes progesterone. Rising level of progesterone inhibits the release of GnRH, which, in turn, inhibits the production of FSH, LH and progesterone



Hormonal control of female reproductive system

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