



Biology (044)
GRADE XII - 2024-25

Time: 3 Hours

Date:04/09/2023

Max. Marks: 70

General Instructions:

- 1.All questions are compulsory.
- 2.The question paper has five sections and 33 questions. All questions are compulsory.
- 3.Section—A has 16 questions of 1 mark each; Section—B has 5 questions of 2 marks each; Section—C has 7 questions of 3 marks each: Section—D has 2 case-based questions of 4 marks each; and Section—E has 3 questions of 5 marks each.
- 4.There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- 5.Wherever necessary, neat and properly labelled diagrams should be drawn.

Qn. No		
SECTION A		
1	Feathery stigma occurs in (b) wheat	1
2	The substance produced by a cell in viral infection that can protect other cells from further infection is (c) interferon	1
3	Which of the following approaches does not give the defined action of contraceptive? (b)Vasectomy - Prevents spermatogenesis	1

4	Which among the following has 23 chromosomes ? (c) Secondary oocyte	1
5	The law of segregation of characters postulated by Mendel can be related to (c) a gamete receiving only one of the two homologous chromosomes during gamete formation.	1
6	Which of the following will not result in variations among siblings ? (c) Linkage	1
7	Egg apparatus consists of (a) egg cell and two synergids.	1
8	Which of the following is not a water pollinated plant ? (d) Cannabis	1
9	Acrosomal reaction of the sperm occurs due to (a) its contact with zona pellucida of the ova	1
10	Which of the following hormones is not secreted by human placenta ? (d) LH	1
11	A cross was made between two plants. The resultant off springs carries 50% dominant phenotypic character (T) and 50% recessive phenotypic character (t). What would be the genotype of parents? (b) Tt X tt	1
12	During microsporogenesis, meiosis occurs in (b) microspore mother cells	1
<p>DIRECTION:Q. No. 13-16: Consist of two statements— Assertion (A) and Reason (R).Answer these questions selecting the appropriate option given below:</p> <p>(a) Both A and R are true and R is the correct explanation of A.</p>		

<p>(b) Both A and R are true and R is not the correct explanation of A.</p> <p>(c) A and R are false.</p> <p>(d) A is False but R is true.</p>		
13	<p>Assertion: Hydrophily is a major mode of pollination in most of the aquatic plants in angiosperms.</p> <p>Reason: Almost all the aquatic dicot and monocot plants require water for the transport of male gametes and for fertilisation.</p> <p>(D)</p> <p>Hydrophily is the mode of pollination through the agency of water.</p> <p>Pollination is the process by which pollen grains are transferred from the mature flower anther to the stigma of another flower.</p> <p>Pollination through water is rare in flowering plants. It is limited to only about 30 genera mostly monocotyledons such as <i>Zostera</i>, <i>Vallisneria</i>, <i>Ceratophyllum</i>, etc.</p> <p>In many aquatic flowering plants, pollination can occur by insects or wind. For example, water lily, lotus, water hyacinth, etc.</p>	1
14	<p>Assertion: A test cross is used to determine the phenotype of an organism.</p> <p>Reason: F₂ generation of a monohybrid test cross produces one or two phenotypes depending upon the genotype of the unknown organism.</p> <p>(D)</p>	1
15	<p>Assertion: Artificial insemination is the method of introduction of semen inside the female.</p>	1

	Reason: This technique is used in those cases where males have low sperm count (A)	
16	Assertion: The endometrium undergoes cyclical changes during menstrual cycle. Reason: The myometrium exhibits strong contractions during delivery of baby. (B)	1
Section—B		
17	How do cellular barriers and cytokine barriers provide innate immunity? Cellular barriers: Certain types of leukocytes (WBC) of our body like polymorphonuclear leukocytes (PMNL-neutrophils) and monocytes and natural killer (type of lymphocytes) cells in the blood as well as macrophages in tissues can phagocytose and destroy microbes. Cytokine barriers: Interferon is a protein secreted by virus infected cells which protects healthy cells from viral infection.	2
18	What do you mean by foetal ejection reflex? Foetal ejection reflex refers to the signals for parturition that originate from the fully developed foetus and the placenta, which induces mild uterine contractions. Process of foetal ejection reflex: Fully developed foetus pushes down the birth canal, causing stretching of the cervix	2
19	Why is the process of fertilisation in a flowering plant referred to as double fertilisation? a) In double fertilization process, one of the two pollen nuclei fuses with egg and another with polar nuclei. Hence, there are two types of fusion, one is fertilization and another is triple fusion. Thus, fertilization in an angiosperm is called as double fertilization.	2
20	What does secondary productivity in an ecosystem indicate? List any two factors by which productivity is limited in aquatic systems. Secondary productivity indicates the organic matter synthesized by the consumers specially by the primary consumers or herbivores. The two factors by which the productivity is limited in an aquatic ecosystem are light and nutrient supply	2
21	What is codominance? State one example in human	2

	<p>Codominance is a genetic phenomenon where two different versions of a gene, or alleles, are both expressed equally in an organism. This results in a combination of traits from each allele being displayed simultaneously.</p> <p>One example of codominance in humans is blood type</p>	
Section—C		
22	<p>(a) State the cause and symptoms of Down's syndrome. Name and explain the event responsible for causing this syndrome.</p> <p>(b) Haemophilia and Thalassemia are both examples of Mendelian disorder, but show differences in their inheritance pattern. Explain how. Down syndrome is a genetic disorder caused by an extra copy of chromosome 21, which can occur due to a random error in cell division called nondisjunction. This error usually happens during the formation of eggs or sperm, and in most cases, the extra copy comes from the mother.</p> <p>Thalassemia- Anaemia Haemophilia-Non stop bleeding Haemophilia- Sex linked recessive disorder is generally passed on from carrier mother to some of her sons / from affected father to daughter carrier. Detailed answer: Difference in inheritance pattern : Haemophilia : It is a sex-linked X-linked recessive disorder inherited from haemophilic father XhY or carrier mother XhX. Females are haemophilic only in homozygous double recessive state XhXh but such females die before birth. Thalassemia: It is caused by haemolytic anaemia. It shows autosomal recessive pattern of inheritance and is controlled by two pairs of alleles HBA1 & HBA2. The effect is more pronounced when the defective gene occur in homozygous state causing thalassemia major. In heterozygous state the adverse effect of thalassemia is minor. The trait Thalassemia is inherited as autosomal recessive. This is found equally in males and females both. However the defective alleles for thalassemia in both males & females unlike haemophilia expresses itself only when it is in homozygous condition. The heterozygotes for recessive trait remain unnoticed but act as heterozygous carriers.</p>	3
23	<p>Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree? Give reasons in support of your answer.</p> <p>Yes breastfeeding is important for newborn babies. The milk produced during initial stages of lactation called colostrum is a rich source of antibodies. This antibodies protect the baby from external viral and bacterial infection. It also has a balanced nutrients which is extremely beneficial for newborn babies.</p>	3

24	<p>(a) Cancer is one of the most dreaded diseases. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease.</p> <p>(b) Name the group of genes that have been identified in normal cells that could lead to cancer. How do these genes cause cancer?</p> <p>(a) Contact with other cells inhibits their uncontrolled growth tumour cell reach distant sites, through blood</p> <p>(b) Proto-oncogenes . When activated under certain condition could lead to the oncogenic transformation of the cells. transformation of the cells.</p> <p>(c) Biopsy/radiography/CT/MRI(any two)</p> <p>(d) it activates immune system destroys a tumour.</p>	3
25	<p>Name the organic materials exine and intine of an angiosperm pollen grains are made up of. Explain the role of exine.</p> <p>The exine is made up of sporopollenin which is one of the most resistant organic material. The intine layer is made up of cellulose and pectin materials. The exine is hard and hence protects the pollen grains during adverse conditions. Detailed Answer:Exine is made up of a substance called sporopollenin while intine is made up of pectocellulose.Sporopollenin is a resistant fatty substance therefore exine functions as protective covering of pollen grain. It also possesses the proteins for enzymatic and compatibility reactions.</p>	3
26	<p>Explain the zygote intrafallopian transfer technique (ZIFT). How is intrauterine transfer technique (IUT) different from it?</p> <p>Zygote intra fallopian transfer technique (ZIFT) is a technique in in vitro fertilisation where the zygote or early embryo having up to 8 blastomeres is transferred into the fallopian tube to complete its further development.</p> <p>Intra Uterine Transfer technique (IUT) is different from ZIFT as the embryos with more than 8 blastomeres are transferred into the uterus in IUT</p>	3
27	<p>Describe the post-zygotic events leading to implantation and placenta formation in humans. Mention any two functions of placenta.</p> <p>Soon after formation of zygote cleavage divisions start in the zygote as it moves through the oviduct towards uterus. The zygote forms daughter cells called blastomeres. The embryo with 8 to 16 blastomeres is called morula. The morula continues to divide and Morula transforms into blastocyst. The blastomeres in the blastocyst are arranged in two Flat layers. Outer layer Implantation is called trophoblast and inner group of cells inner cell mass. The trophoblast gets attached to endometrium of uterus and the inner cell mass gets differentiated into embryo. Attachment of blastocyst to the inner layer of uterus is called implantation and it leads to pregnancy. 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</p>	3

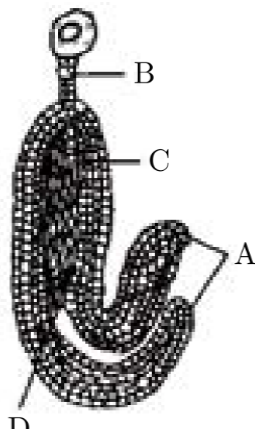
	<p>interdigitated with each other and jointly form a structural and functional unit called placenta. The placenta is connected to the embryo through umbilical cord</p> <p>Functions of Placenta (i)The placenta facilitates the supply of oxygen and nutrients to the embryo and also removal of $C O_2$ and waste materials produced by the embryo. (ii) It acts as an endocrine gland and produces hormones like human chorionic gonadotropin (hCG). human placental lactogen (HPL). estrogen, progesterones and relaxin</p> <p>Read more on Sarthaks.com - https://www.sarthaks.com/1655323/describe-zygotic-leading-implantation-placenta-formation-mention-functions-placenta</p>	
28	<p>A haemophilic father can never pass the gene for haemophilia to his son. Explain.</p> <p>Haemophilia is a sex linked trait. The gene for it is located on X chromosome only not chromosome. Father contributes only Y chromosome to the son and never passes X chromosomes to the son. Therefore father never passes of haemophilic gene to his son.</p>	3
Section—D		
29	<p>Question 1:Read the following and answer any four questions from (i) to (iv) given below:</p> <p>Events of Menstrual Cycle:The major events of the menstrual cycle are as follows as the cycle starts with the menstrual phase, when menstrual flow occurs and it lasts for 3-5 days. The menstrual flow results due to breakdown of the endometrial lining of the uterus and its blood vessels which forms liquid that comes out through vagina. Menstruation only occurs if the released ovum is not fertilised. Lack of menstruation may be indicative of pregnancy. However, it may also be caused due to some other underlying causes like stress, poor health etc. The menstrual phase is followed by the follicular phase.During this phase, the primary follicles in the ovary grow to become a fully mature Graafian follicle and simultaneously the endometrium of uterus regenerates through proliferation. These changes in the ovary and the uterus are induced by changes in the levels of pituitary and ovarian hormones. The secretion of gonadotropins (LH and FSH) increases gradually during the follicular phase, and stimulates follicular development as well as secretion of estrogens by the growing follicles. Both LH and FSH attain a peak level in the middle of cycle (about 14th day). Rapid secretion of LH leading to its maximum level during the mid-cycle called LH surge induces rupture of Graafian follicle and thereby the release of ovum (ovulation). The ovulation (ovulatory phase) is followed by the luteal phase during which the remaining parts of the Graafian follicle transform as the corpus luteum.The corpus luteum secretes large amounts of progesterone which is essential for maintenance of the endometrium.Such an endometrium is necessary for implantation of the fertilised ovum and other events of pregnancy. During pregnancy, all events of the menstrual cycle stop and there is no menstruation. In the absence of fertilisation, the corpus luteum</p>	4

	<p>degenerates. This causes disintegration of the endometrium leading to menstruation, marking a new cycle. In human beings, menstrual cycles cease around 50 years of age; that is termed as menopause. Cyclic menstruation is an indicator of normal reproductive phase and extends between menarche and menopause.</p> <p>(i) What causes menstrual flow?</p> <p>(ii) Why is the secretory phase also known as luteal phase?</p> <p>(iii) What happens if LH secretes rapidly?</p> <p>(iv) Which of the hormones has no role in menstruation?</p>	
30	<p>Read the following and answer the questions from (i) to (iv) given below:</p> <p>Sickle cell anemia is a genetic disorder where the body produces an abnormal hemoglobin called HbS. Red blood cells are normally flexible and round, but when the hemoglobin is defective, blood cells take on a "sickle" or crescent shape. Sickle cell anemia is caused by mutations in a gene called HBB. It is an inherited blood disorder that occurs if both the maternal and paternal copies of the HBB gene are defective. In other words, if an individual receives just one copy of the defective HBB gene, either from mother or father, then the individual has no sickle cell anaemia but has what is called "sickle cell trait". People with sickle cell trait usually do not have any symptoms or problems but they can pass the mutated gene onto their children. There are three inheritance scenarios that can lead to a child having sickle cell anaemia: - Both parents have sickle cell trait - One parent has sickle cell anaemia and the other has sickle cell trait Both parents have sickle cell anaemia</p> <p>(i) Sickle cell anaemia is a/an disease. (a) X linked (b)Autosomal dominant (c) Autosomal recessive (d) Y linked</p> <p>(ii) If both parents have sickle cell trait, then there is the child having sickle cell anaemia. (a) 25 % risk (b)50 % risk (c) 75% risk (d) No risk</p>	4

	<p>(iii) If both parents have sickle cell trait, then there is_____of the child having sickle cell trait. (a) 25 % risk (b)50 % risk (c)75% risk (d) No risk</p> <p>(iv) If one parent has sickle cell anaemia and the other has sickle cell trait, there is _____ their children will have sickle cell anaemia and will have sickle cell trait. (a) 25 % risk, 75% risk (b)50 % risk, 50% risk (c) 75% risk, 25% risk (d)No risk</p>	
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Section—E

31	<p>(a) Explain the role of the following in providing defence against infection in the human body (i) Histamines (ii) Interferons (iii) B-cells.</p> <p>i Histamines: These are chemicals which cause inflammatory responses. ii Interferons: These are glycoproteins which protect non-infected cells from further viral infection. iii B-cells: These produce proteins called antibodies in response to pathogens into the blood to fight with them.</p> <p>(b) Name and explain the two types of immune responses in humans innate and adaptive immune responses..</p> <p>(c) Differentiate between active immunity and passive immunity. Give any one example for passive immunity</p> <p>Two types of immunity exist — active and passive: Active immunity occurs when our own immune system is responsible for protecting us from a pathogen. Passive immunity occurs when we are protected from a pathogen by immunity gained from someone else.</p>	5
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32	<div style="text-align: center;">  </div> <p>(a) Identify the given figure and its labelled parts A, B, C and D.</p>	5
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(b) Explain the development of the given above structure from the embryo sac of dicot flower.

Development of embryo (dicot) in angiosperm :

(1) The development of embryo from a zygote is called embryogenesis .

(2) The fusion of male gamete and an egg cell during fertilization results in the formation of a diploid zygote.

(3) The zygote develops a wall around it and is converted into oospore.

(4) The oospore undergoes a transverse division to form a large basal cell towards the micropyle and a small apical cell towards the interior of the embryo sac. This two celled structure is called proembryo.

(5) The basal cell undergoes repeated transverse divisions to form a multicellular structure called suspensor.

(6) The suspensor pushes the embryo towards the endosperm to draw its nutrition .

(7) The apical cell of the proembryo undergoes a transverse division followed by two vertical divisions at right angles to form an octant stage.

(8) The cells of octant now undergo an unequal periclinal division to form an outer layer of eight smaller cells and an inner layer of eight larger cells.

(9) The cells of the outer layer give rise to the dermatogen. The dermatogen in turn gives rise to the epidermis.

Or

i) Why are zygotes dormant for sometime in the fertilised ovule?

The zygote is dormant in fertilized ovule for sometime because at this time, endosperm needs to develop

ii) What is polyembryony? Give an example.

When a seed results in more than one embryo which developed from an ovum is known as polyembryony. These are identical to each other but are different from parents based on their genetic makeup. Some examples include citrus fruits, Opuntia etc

iii) In fruits, what is formed from following parts:-

a) Ovary wall b) Outer integument c) Inner integument d) zygote

e) Primary endosperm f) Ovary g) Nucellus

33	<p>What do you mean by reproductive health? Mention the different way in which people are made aware of the significance of reproductive healthy society.</p> <p>Reproductive health means total well being in all aspects of reproduction, i.e., physical, emotional, behavioural, social and physiological. Following measures are needed to make people aware of reproductively healthy society: (i) Providing infrastructural facilities and professional expertise to attain reproductive health. (ii) Educating people about birth control methods, care of pregnant mothers, importance of breast feeding, safe and hygienic sexual practices and safeguard against STDs. (iii) Introduction of sex education in schools to give proper information to the young minds about sex-related aspects. (iv) Help of audio-visual and print-media to create awareness among people about reproduction related aspects. (v) Awareness of problems due to population explosion, social evils like sex abuse and sexrelated crimes. (vi) Statutory ban on amniocentesis to legally check female foeticides.</p> <p style="text-align: center;">Or</p> <p>a) Suggest some methods to assist infertile couples to have children? b) Suggest the aspects of reproductive health which need to be given special attention in the present scenario.</p> <ol style="list-style-type: none"> 1. Creating awareness among the people about various reproductive-related aspects such as STDs, available birth control methods, care of pregnant mothers, post-natal care of mother and child, importance of breast feeding, adolescence and related changes, safe and hygienic sexual practices etc. 2. Providing facilities and support for building up a reproductively healthy society. These include medical assistance and care to people especially during pregnancy, delivery, STDs, abortions, contraception, menstrual problems, infertility etc. 	5
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