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| **Text  Description automatically generated**  **PB2/BIOEEAK/1222/C 12-JAN-2023**  **Class XII**  **BIOLOGY (044)**  **MARKING SCHEME**  **Maximum Mark :70 Time: 3 hours** |

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|  | SECTION A |  |
| Q. No. | Question | Marks |
| 1. | Increased IMR and decreased MMR in a population will:  (a) cause rapid increase in growth rate (b) result in decline in growth rate (c) not cause significant change in growth rate (d) result in an explosive population  Ans : C | 1 |
| 2. | In-vitro fertilization involves transfer of \_\_\_\_ into the fallopian tube. (a) embryo up to eight cell stage (b) embryo of thirty-two cell stage (c) zygote (d) either zygote or embryo up to eight cell stage  Ans : D | 1 |
| 3. | Which one of the following pairs of codons is correctly matched with its function or a signal for a particular amino acid?  a) AUG; ACG -Start/ Methionine  b) UUA; UCA –Leucine  c) GUU; GCU -Alanine  d) UAG; UGA -Stop.  Ans : D | 1 |
| 4. | ……… is a CNS stimulant as it interferes with the transport of the neuro-transmitter ………  (a) Cocaine, acetylcholine  (b) Barbiturate, glutamate  (c) Cocaine, dopamine  (d) Barbiturate, glycine  Ans : C | 1 |
| 5. | The spent slurry from the biogas plant is used as ………. . (a).cooking fuel, (b).biofertiliser, (c).manure, (d).inoculum  Ans : C | 1 |
| 6. | Identify the wrong pair: (a). Statin : Monascus, (b).Cyclosporin : Trichoderma (c.) Penicillin : Staphylococci, (d.)Ethanol : Yeast  Ans : C | 1 |
| 7. | The first restriction endonuclease reported was a) Hind II b) EcoRI c) Hind III d) BamHI  Ans : A | 1 |
| 8. | Human insulin is being commercially produced from a transgenic species of (a) Rhizobium (b) Saccharomyces (c) Escherichia (d) Agrobacterium  Ans : C | 1 |
| 9 | Geometric representation of age structure is a characteristics of .. [a] Population [b] Land scape [c] Ecosystem [d] Biotic community  Ans : A | 1 |
| 10 | The tendency of population to remain in genetic equlibrium may be disturbed by-[a] Lack of migration [b] Lack of mutations[c] lack of random mating [d] Random mating  Ans : D | 1 |
| 11 | -------------and his colleges have very recently tried to put price tags on Nature‘s life support services.  a. Robert Constanza b. Robert May c. Paul Erlich d. Alexander Von Humbolt  Ans : A | 1 |
| 12 | Biodiversity of a geographical region represents (a) Endangered species found in the region (b) The diversity in the organisms living in the region (c) Genetic diversity in the dominant species of the region (d) Species endemic to the region  Ans : B | 1 |
|  | Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as: (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.  (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.  (c) If Assertion is true but Reason is false.  (d) If both Assertion and Reason are false. | 1 |
| 13 | c | 1 |
| 14 | c | 1 |
| 15 | a | 1 |
| 16 | a |  |
|  | SECTION B |  |
| 17 | The enzymes of the acrosome help to dissolve zona pellucida layer and plasma membrane of the ovum for the entry of the sperm into the cytoplasm of the ovum. 1+1 | 1+1 |
| 18 | 1)sterile female 2)poorly developed breast 3)short stature 4) small uterus ½×4 | 1+1 |
| 19 | Infections like HIV& Hepatitis , Dependence of these drugs ½+1/2+1 | 2 |
| 20 |  | 2 |
| 21 | a. Inverted b .Number of individuals increase in higher trophic level. Pyramid of biomass in sea. ½+1+1/2 | 2 |
|  | SECTION C |  |
| 22 | Write the differences between wind-pollinated and insect pollinated flowers. Give examples of each type.  Ans :  **Wind pollinated flowers:**  a)The flowers are small, and not showy or fragrant  b)They do not produce nectar.  c)Stamens are well exposed.  d)Pollen grains are light and non-sticky  e)Often, they have feathery stigma  Eg. Maize, Cannabis  **Insect pollinated flowers:**  a)The flowers are large, showy and fragrant.  b)They produce a large quantity of nectar.  c)Stamens are not exposed  d)Pollen grains are sticky  e)stigma is also sticky  Eg. Yucca, Sunflower.  ( three points each ) | ½ ×6=3 |
| 23 | What is ovulation? What happens to the Graafian follicle after ovulation?  Answer: Ovulation: The release of eggs (at secondary oocyte stage) after rupturing of Graafian follicle is called ovulation. After the ovulation, the granulosa cells as well as the stroma cells from theca Interna rapidly multiply to fill the cavity of the Graafian follicle which becomes the corpus luteum. If fertilization occurs, the corpus luteum grows further and secretes hormones. If fertilization does not take place, the corpus luteum regresses and forms a yellow body. | 1+2 |
| 24 | Enlist the methodologies involved in the Human Genome Project.  Methodology:  ● To identify all the genes that expressed as RNA referred as Expressed Sequence Tags  (ETSs).  ● Simply sequencing the whole set of genome that contained all the coding and non-coding  sequence, and later assigning different regions in the sequence with functions  calledSequence Annotation.  ● The commonly used hosts for sequencing were bacteria and yeast and vectors were called  BAC (bacterial artificial chromosome) and YAC (yeast artificial chromosome). | 3 |
| 25 | How did Darwin theory of natural selection explain the appearance of new forms on the earth?  Ans : **Darwin's theory of Natural selection:**  Any population has built in variation for every character. Individuals with those characters which enable them to survive better would outbreed the others, who are less adapted. Fitness, according to Darwin's is reproductive fitness, i.e., individuals who are better fit in an environment leaves more progeny than others. These progenies now comes to possess more fit individuals, i.e., nature selects the better fit individuals and over a long period of time, through a number of generations, the population slowly becomes modified into a different form, or a species, which is called evolution. | 3 |
| 26 | Ans :  a). First infection produce primary response and antibodies are generated against chickenpox virus encounter subsequently with the same virus elicits a highly intensified secondary response Due to the memory cells formed during the first encounter, Active immunity (1/2x4=2)  b) Proteins secreted by viral infected cells which protects non-infected cells from viral infection/When alpha interferon is given to cancer patients (it activates immune system) destroys tumor (1)  *OR*  a) Adolescents are easily affected by peer pressure/adventure/curiosity/excitement /experimentation (any two)(1/2+1/2=1)  b). Addiction-psychological attachment to certain effects such as euphoria/temporary feeling of wellbeing (1) | 3 |
| 27 | How are restriction endonuclease enzymes named? Write examples.  Ans : The first letter of the name comes from the genus and the next two letters from the name of the species of the prokaryotic cell from which they are isolated.  The next letter comes from the strain of the prokaryote.  The roman numbers following these four letters indicate the order in which the enzymes were isolated from that strain of the bacterium.  Eg.EcoR I is isolated from Escherichia coli RY 13 | 3 |
| 28 | 1. Why is there a need to conserve biodiversity?   (ii) Name and explain any two ways that are responsible for the loss of biodiversity.  Ans: (i) The narrowly utilitarian- Biodiversity provides direct economic benefits from nature like food, firewood, fibres, medicinal plants, industrial products etc.  The Broadly Utilitarian- Biodiversity plays a major role in ecosystem services like productions of Oxygen during photosynthesis, pollination without natural pollinator, pleasure from nature are priceless.  Ethical- for conserving biodiversity relates to what we own to millions of plants, animals and microbes species with whom we share this planet.  (ii) Over-exploitation- Many species extinctions in the last 500 years were due to overexploitation by humans. For example- Steller’s sea cow, passenger pigeon.  Alien species invasions- Some of alien species turn invasive and cause decline or extinction of indigenous species. E.g. The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of more than 200 species of cichlid fish in the lake. Invasive weeds species like carrot grass (parthenium), Lantana and water hyacinth causing threats to indigenous species. | 3 |
|  | SECTION D |  |
| 29 | Ans   |  |  | | --- | --- | | **I** | **c** | | **ii** | **c** | | **iii** | **d** | | **iv** | **b** | | 4 |
| 30 | Que. 4) Write the name of pathogenic bacteria that causes typhoid and its symptoms.  Ans :  1)(a) Mary Mallon.  2) (b) *Salmonella typhi*.  3) (d) Pathogens.  4) Answer: A pathogenic bacterium that causes typhoid fever in humans is *Salmonella typhi*. *Salmonella typhi* causes typhoid by entering small intestine. The common symptoms of typhoid disease are weakness, high fever, and loss of appetite, constipation, and headache. |  |
|  | **SECTION E** |  |
| 31 | Answer:  The cycle of events starting from one menstruation till next in female primates is called menstrual cycle. It comprises of four phases which are regulated by both pituitary (LH and FSH) and ovarian (oestrogen and progesterone) hormones that affect ovaries and uterus, respectively. The events occurring in a menstrual cycle are as follows  Menstrual phase (from 3rd-5th day in a 28-day cycle) Initiated by reduced secretion of LH, progesterone and oestrogen. The endometrium breaks down and blood along with ertilizatio ovum constitutes menstrual flow.  Follicular phase (from 6th-13th day in a 28-day cycle) The FSH (Follicle Stimulating Hormone) secreted by anterior pituitary stimulates ovarian follicle to secrete oestrogens. These oestrogens stimulate proliferation of uterine walls as a result of which endometrium gets thickened (due to rapid cell division and increase in uterine glands and blood vessels).  Ovulatory phase (14th day in 28-day cycle) -Pituitary hormones, i.e. LH and FSH reach the highest level in middle of the cycle. Rapid secretion of LH causes ovulation thus, inducing the rupture of Graafian follicle to release secondary oocyte and a polar body.  Luteal or secretory phase (from 15th-28th day in a 28-day cycle) The pituitary hormone LH stimulates the remaining cells of ovarian follicles to develop into corpus luteum. This corpus luteum secretes large amount of progesterone and maintains endometrium thickening for the implantation of ertilizat ovum during pregnancy. In the absence of ertilization, the hormone levels are reduced (LH and progesterone) and endometrium disintegrates leading to onset of another menstrual cycle.  *OR*  When the zygote moves through the isthmus of the oviduct, the mitotic division is initiated and is called the cleavage towards the uterus to form 2,4,8,16 daughter cells called blastomeres. It is an embryo containing 8 to 16 blastomeres from the morula. It continues to transform and divide into blastocysts as it further approaches the uterus. In the blastocyst, the blastomeres are organized into an outer layer referred to as the trophoblast and the inner cell mass, which is an inner collection of cells attached to the trophoblast. This layer gets attached to the endometrium and the inner cell mass transforms into the embryo. After attachment, the cells of the uterus rapidly divide and covers up the entire blastocyst. This causes the blastocyst to implant in the endometrium of the uterus which leads to conception. | 5 |
| 32 | (  **OR**  Griffith observed two types of streptococcus pneumonia- smooth shiny colony called S type virulent with capsule, the other R type rough colony non-virulent ½+1/2=1  Live S type--🡪 injected into mice-🡪 mice died= ½  Live R type--🡪 injected into mice-🡪 no infection= ½  Heat killed type-🡪 injected into mice -🡪 no infection=1/2  Heat killed + live R type-🡪 injected into mice-🡪 mice died= ½  Griffith concluded that the genetic material of heat killed S type could transform R type into virulent S type =1/2  He concluded that R strain bacteria had been transformed by the heat killed S-strain bacteria=1 (5 marks) | 5  Diagram-3.  Label-2 |
| 33 | 1. The insect that attacks cotton crops is cotton bollworms. Bt cotton is made by using a bacterium called as Bacillus thuringiensis. This bacterium produces a protein that kills certain insects. B. thuringiensis forms protein crystals (Cry) during a phase of its growth. These crystals contain a toxic insecticidal protein. Specific Bt toxin genes were isolated from Bacillus thuringiensis and incorporated into cotton.This Bt toxin does not kill the Bacillus because it exists as inactive protoxins in its body. However,when an insect ingests the inactive toxin, it gets exposed to the alkaline Ph of the gut, which solubilises the crystals and converts it into active form. The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually causes death of the insect. In this manner, the crop is saved from insects and a large yield is obtained.1+1+1+1   (ii) Gene cry Iab secretes a protein that inhibits the growth of corn borer insects1  **OR**   1. Genetically modified plants can reduce the usage of chemical pesticides by introducing pest resistant plants.For example, there are several nematodes that parasitic, a wide variety of plants and animals including human beings. A nematode, Meloidogyne incognita infects the roots of tobacco plants and causes a great reduction in yield. A novel strategy   was adopted to prevent this infestation which was based on the process of RNA interference (RNAi).Using Agrobacterium vectors, nematode, specific genes were introduced into the host plant. The introduction of DNA was such that it produced both sense and antisense RNA in the host cells.These two RNA’s being complementary to each other formed a double-stranded RNA that initiated RNAi and thus, silenced the specific Mrna of the nematode. The consequence was that the parasite could not survive in a transgenic host expressing specific interfering RNA.  (ii) Genetically modified plants can enhance the nutritional value of food crops.For example, ‘Golden rice’ developed at Swiss Federal Institute of technology is an example of nutritionally modified crop. It is rich in vitamin-A (b-carotene). The rice grains are golden-yellow in colour. It contains ‘beta-carotene’ gene from daffodil plant and also from some bacteria. Golden rice can prevent child blindness which is caused due to the deficiency of vitamin-A 3+2 | 5 |

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