Biology

Time: 3 Hours 15 Minutes **Total Marks: 70**

Instruction to Candidates: See previous year

Section-I (Objective type Question)

The following Question Nos. 1 to 35 there is only one correct answer against each question. For each question, mark the correct option on the answer sheet:

35 x 1 =35

1. The total number of eggs produced by a healthy human female during life time is:
   (A) 4000 (B) 400 (C) 40 (D) 365

   ANS:(B) 400

2. The main reason for making copper T most effective and popular Intra Uterine device in female :
   (A) Reduction in fertilization ability of spermatozoa
   (B) Increased phagocytosis of spermatozoa due to release of copper ion
   (C) Reduction in motility of spermatozoa
   (D) All of these

   ANS:(B)Increased phagocytosis of spermatozoa due to release of copper ion

3. In which of the following species of plants seeds are produced through apomixes:
   (A) Asteraceae (B) Mustard

   (C) Citrus and Mango (D) None of these

   ANS:(A) Asteraceae

4. Genes present on the same locus having different expression are called:
   (A) Multiple allele (B) Polygene

   (C) Oncogene (D) Codominant gene

   ANS:(A) Multiple allele

5. The human chromosome with highest and least number of genes are:
   (A) Chromosome 21 and Y (B) Chromosome 1 and X

   (C) Chromosome 1 and Y (D) Chromosome X and Y

   ANS:(C) Chromosome 1 and Y

6. Sickle cell anemia shows:-
   (A) Epistasis (B) Co-dominance
   (C) Pleiotropy (D) Incomplete dominance

   ANS:(C) Pleiotropy

7. Adaptive radiation in Australian marsupials are example of :
   (A) Divergent evolution (B) Convergent evolution
   (C) Saltation (D) None of these

   ANS:(B) Convergent evolution

8. The trisomy of 21st chromosome causes:
   (A) Klinefelter's syndrome (B) Turner's syndrome
   (C) Sickle cell anaemia (D) Down's syndrome

   ANS:(D) Down's syndrome

9. A normal vision female whose father is colour-blind marries a normal vision male. What would be the probability of her sons and daughter to be colour blind?
   (A) 25% sons colour blind and all daughters with phenotypically normal vision.
   (B) 50% sons colour blind and 50 daughter normal.
   (C) 50% sons colour blind and 50% daughter color blind
   (D) All sons normal and 50% colour blind daughter

   ANS:(B) 50% sons colour blind and 50 daughter normal.

10. Appearance of antibiotic resistance bacteria is an example of:
    (A) Adaptive radiation (B) Transduction
    (C) Preexisting variation (D) Divergent evolution

    ANS:(B) Transduction

11. Which of the following is involved in transcription of tRNA, 5Sr RNA and Sn RNA of eukaryotes?
    (A) RNA Polymerase I (B) RNA Polymerase II
    (C) RNA Polymerase III (D) All of these

    ANS:(C) RNA Polymerase III

12. A child with blood group 'O' has 'B' blood group type father then the father has Geno type of :
    (A) I^OI^O (B) I^OI^B (C) I^BI^B (D) I^AI^A

    ANS:(B) I^OI^B

13. ‘Flaver Saver’ is a-
(A) Pesticide (B) Chicken breed
(C) Transgenic Tomato (D) Insecticidal Protein

ANS:(C) Transgenic Tomato

14. The specific sequence of DNA recognized by Restriction Endonuclease are:
(A) Palindromic nucleotide sequence
(B) VNTR
(C) Minisatellite (D) All of these

ANS:(A) Palindromic nucleotide sequence

15. Silencing of gene could be achieved through the use of:
(A) Short interfering RNA((RNAi) (B) Antisense RNA
(C)(A) & (B) both (D) none of these

ANS:(C)(A) & (B) both

16. The first clinical gene therapy was given for:
(A) Adenosine Deaminase Deficiency (B) Chicken Pox
(C) Diabetes Mellitus (D) Rheumatoid Arthritis

ANS:(A) Adenosine Deaminase Deficiency

17. GAATTC is recognition site for which restriction endonuclease?
(A) Hind III (B) Eco R I
(C) BAM I (D) HEA III

ANS:(B) Eco R I

18. The first transgenic cow was named as:
(A) Daisy (B) Maizy (C) Dolly (D) Rosie

ANS:(D) Rosie

19. Which of the following Nemotodes infect the root of tobacco plants?
(A) Bacillus thuringiensis (B) Cry IAC
(C) Meloidogyne incognita (D) Both (A) and (B)

ANS:(C) Meloidogyne incognita

20. A molecular technique in which multiple copy of the desired gene is synthesized is vitro is called as:
(A) ELISA (B) PCR
(C) Gel Electrophoresis (D) Flow cytometry

ANS:(B) PCR

21. Which of the following enzyme is used to break the bacterial cell wall to release DNA and other bio micro molecules?
(A) Lysozyme (B) cellulose

(C) Chitinase (D) Collagenase

ANS:(B) cellulose

22. Which of the following is an example of auto-immune disease?
(A) Asthma (B) Rheumatoid arthritis

(C) Cancer (D) None of these

ANS:(A) Asthma

23. The immediate metabolic changes in the body noticed after consuming tobacco is:-
(A) Release of catecholamine due to stimulation of adrenal gland
(B) Sudden increase in BP & heart beat

(C) (A) & (B) both (D) None of these

ANS:(C) (A) & (B) both

24. 'SonaLika' and 'KalyanSona' are high yielding disease resistant variety of
(A) Rice (B) Wheat (C) Maize (D) Cotton

ANS:(B) Wheat

25. Which of the following is not bio fertilizer?
(A) Azotobacter (B) Bacillus thuringiensis

(C) Clostridium (D) Azolla

ANS:(B) Bacillus thuringiensis

26. Masses of bacteria associated with fungal filament to form a mesh like structure is called:
(A) Floc (B) Methanogen (C) Plasminogen (D) None of these

ANS:(A) Floc

27. Probiotic are:
(A) A new kind of food allergen (B) Safe antibiotics

(C) Live microbial food supplement (D) Cancer inducing microbes

ANS:(B) Safe antibiotics

28. The toxic protein secreted by Bacillus thuringiensis is :
(A) Tubulin (B) Insulin (C) Cry Protein (D) All of these

ANS:(C) Cry Protein

29. Which of the following is a retro virus?
(A) Human Immune Deficiency virus (B) Hepatitis virus
(C) Micro virus influenzii (D) all of these

ANS:(A) Human Immune Deficiency virus

30. Which of the following disease is generated by allergen?
(A) Skin Cancer (B) Hay fever (C) Enteric fever (D) Goiter

ANS:(B) Hay fever

31. Photochemical smog consists of :
(A) SO_2, PAN and smoke (B) Ozone, PAN and NO_2
(C) Ozone, SO_2 and Hydrocarbon (D) SO_2, CO_2 and hydrocarbon

ANS:(A) SO_2, PAN and smoke

32. Snow blindness is human being is caused by:
(A) Absorption of UV, β radiation (B) absorption of infra radiation
(C) Absorption of cosmic radiation (D) Erosion of cornea by snow

ANS:(D) Erosion of cornea by snow

33. The thickness of ozone in a column of air from the ground to the top of atmosphere is measured in terms of:
(A) Dobson Unit (B) Arab Unit
(C) Pascal Unit (D) None of these

ANS:(A) Dobson Unit

34. The total number of Bio diversity hot spots in the world is:
(A) 25 (B) 9 (C) 34 (D) None of these

ANS:(C) 34

35. Which of the following is greenhouse gas?
(A) Methane (B) CO_2
(C) Chloro-fluoro carbon (D) All of these

ANS:(D) All of these

Section-II : (Non-Objective Type Question)

Question Nos. 1 to 15 are of short answer type. Each question carries 2 marks. Answer any ten(10) questions on your copy.

10x2=20

Short Answer Type Questions

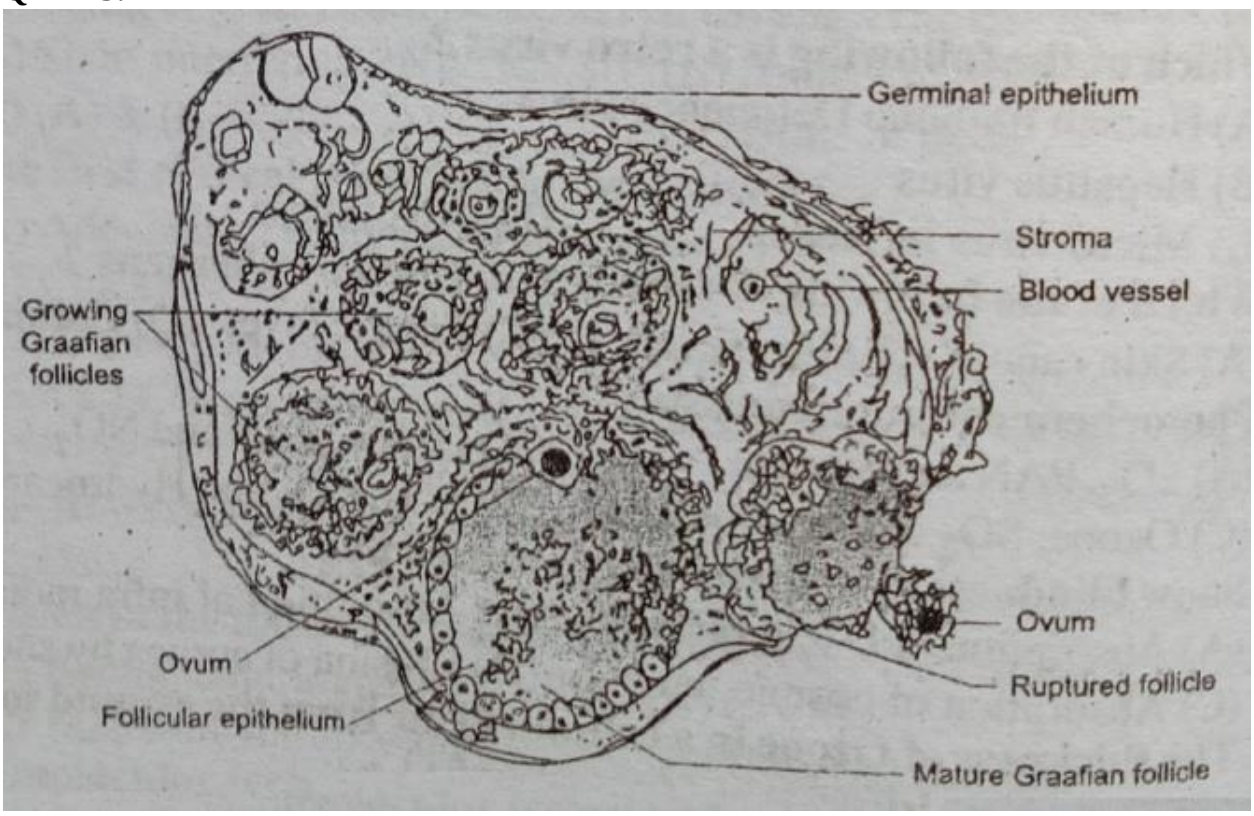
1. **What do you mean by incomplete dominance? Explain with suitable example.** **(2)**

   Q1 ANS: Incomplete dominance is the phenomenon where none of the two contrasting alleles is dominant.

   Ex: There are two types of pure short horned cattle-red and white. Or cross-breeding the individuals of the F1 generation are found to have roar colour. The effect is produced due to fine mixing of red and white hair (mosaic)

2. **Draw a neat and well labeled diagram of transverse section of human ovary** **(2)**

   Q2 ANS:



3. **Describe the two salient features of double Helix structure of DNA.** **(2)**

Q3 ANS: (i) DNA is a helically twisted double chain polydeorxy ribonucleotide macro molecule which is formed by cross-linking of three chemicals, phosphoric acid, deoxy ribose sugar and nitrogen base.
(ii) Four types of nitrogen base occur in DNA-Adenine guanine, cytosine and thymine. Only one of the two strands of DNA possess correct hereditary information. It is known as sense strand.

4. **Define and give one example of each of the following: (i) False fruit (ii) True fruit (iii) Parthenogenic fruits (iv) Polyembryony (2)**

Q4 ANS: (i) False fruits: It is that fruit which develops from accessory floral parts. Ex. Apple.
(ii) True Fruits: It develops only from ovary of a flower Ex. Maize
(iii) Parthenogenic Fruits: It is a seedless fruit which may or may not require stimulus of pollination for its formation. Ex Banana.
(iv) Polyembryony: The formation of more than one embryo from a single fertilized ovum. Ex. Mango.

5. **What is gene mutation? What is its role in organic evolution? (2)**

Q5 ANS: Gene mutation are sudden inherited discontinuous variation which are caused by a change in the nucleotide sequence of DNA segment. Mutation are the source of all variations and hence fountain head of evolution. Mutation theory can explain both progressive and retrogressive evolution.

6. **Name any two (2) enzymes of DNA replication and mention one specific function of each of them. (2)**

Q6 ANS: Enzymes: (i) Helicases: Unwind the DNA helix and separate the two strands.
(ii) DNA Ligase: It is required for joining of DNA fragments.

7. **What do you mean by genetically modified organism? Describe two (2) benefits of these crops. (2)**

Q7 ANS: Genes are modified in genetically modified organism.
Benefits: (i) It increases the nutrient level in food grains.
(ii) There is no need of insecticide

8. **What is micro injection? How it is helpful in recombinant DNA technology? (2)**

Q8 ANS: Micro injection is a technique of delivering foreign DNA into a living cell through a glass micropipette.
Micro injection is helpful in recombinant DNA technology for extraction of desired product.

9. **What is restriction endonuclease? What is its significance in genetic engineering? (2)**

Q9 ANS: An enzyme which cuts DNA segment at some particular site is known as restriction endonuclease.
Restriction endonuclease is used in DNA recombinant technique.

10. What do you mean by sewage? Describe the role of microbes in sewage treatment. (2)

Q10 ANS: Sewage is a type of waste water that is produced from a community of people. Microbes consumes the major part of the organic matter in the sewage and reduce B.O.D.

11. What is micro propagation? What are the advantages of producing plants through this technique? (2)

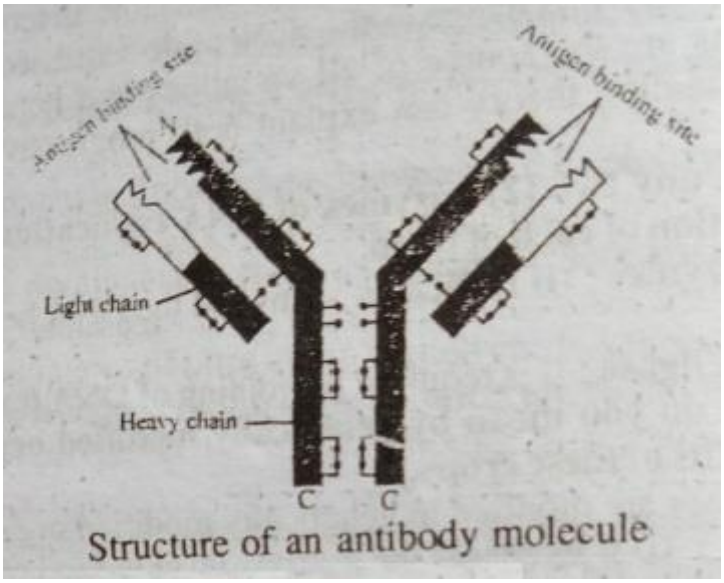
Q11 ANS: Micro propagation is the practice of rapidly multiplying stock plant material to produce a large number of progeny plants using modern plant tissue culture method. The main advantage of micro propagation is the production of many plants that are clones of each other.

12. Describe the causative organism, mode of transmission, symptoms and therapy of malaria disease. (2)

Q12 ANS: In human being malaria is caused by plasmodium species (Ex. Plasmodium vivax)
Mode of transmission: Female anopheles mosquitoes feed on human blood and serve as carrier of malaria parasite.
Symptoms of the patient displays symptoms of malaria fever after a period of 14 days in plasmodium vivax from infectious bite.
Therapy: It can be treated with the help of drugs only e.g. Quinine, Chloroquine, Camoquin etc.

13. Draw a neat, well labeled diagram of a typical antibody. (2)

Q13 ANS:



Structure of an antibody molecule

Fig: Structure of an antibody molecule

14. **What is Biodiversity hotspot? Write down the name and specialties of two such hotspots found in India. (2)**

Q14 ANS: The hot spots are the most threatened preservation of plants and animals life on earth. The Western Ghats and Eastern Himalaya are two hot spots found in India.

15. **What do you mean by Ozone hole? What are main reasons for Ozone depletion? (2)**

Q15 ANS: In Antarctica region, there was gradual reduction in thickness of Ozone layer. The decline is ozone layer thickness in spring time is known a Ozone hole. CFCS and Ozone depleting substances like CH_4 and N_2O escaping in the stratosphere are causing destruction of Ozone there.

Long Answer Type Questions

Question Nos. 16 to 18 are of long answer type questions. All questions are compulsory. In each question there are internal options. 3x5 = 15

16. **Discuss various methods of contraception for the regulation of population?**

Q16 ANS: Various methods of contraception are as follows:

(i) Cervical cap: It is a rubber nipple fitted over the cervix to prevent entry of sperms into uterus**.**

(ii) **Condom:** It is a tabular sheath rolled over the male copulatory on during sex.

(iii) Oral pills are taken daily for 21 days starting from the first five days of menstrual cycle.

(iv) Mini pills like Saheli taken once in a week.

(v) Intrauterine device (IUD) are also used for contraception

(vi) In male vasectomy and in female tubectomy are the methods of contraception.

Q16 Or, What do you mean by chromosomal disorder? Describe the care and related abnormalities in the following genetic disorder:

(i) Down's syndrome (ii) Klinefelter'sSyndrome (iii) Turner's syndrome

Q16 Or, ANS: (i) Down's Syndrome: A genetic chromosome 21 disorder cause development and intellectual delays. Children who have Down syndrome tend to have certain features such as flat face and short neck etc. Here one more chromosome is present in 21 chromosomes.

(ii) Klinefelter's Syndrome: Klinedelter's syndrome is generally present in one child per five thousand. Such child has primary male sex organ but will age testis do not develop proportionally. But deposition takes place and appearance are like a female. The

mammary glands also develop to some extent and the man becomes sterile with insufficient androgen in the blood.

Cells of such syndrome contains 47 chromosomes instead of usual 46. It is due to the presents of two XX chromosomes and one Y chromosome with usual number of autosomes i.e. 2S+xxy. It appears that Y-chromosome has some specific genes with are responsible for the expression of male characteristics but in such syndromes the two xx-chromosomes check the expression of these genes.

(iii) Turner's syndrome: Such syndrome is found one per thousand female children. Phenotypically it is a female but adult character and their function are lacking. Such woman is dwarf not clever and no proper development of mammary glands takes place. The ovary is mostly filled with connective tissues and it lacks estrogen hormone.

Cells of such syndrome contains 45 chromosomes. One X-chromosome is lacking from normal two X-chromosomes (XX) XX-chromosomes are necessary in female human beings for normal development of ovary and normal secretion of female sex hormones. So that reproduction can take place. But due to lack of X-chromosome such types of syndrome is known as Turner's syndrome.

17. What is Adaptive radiation? Illustrate it giving suitable examples. (5)

Q17 ANS: Adaptive radiation is the formation of a number of species from a common ancestor with new species adapting to different ecological niches. Adaptive radiation is also called divergent evolution. The best examples of adaptive radiation are finches of Galapagos Islands and marsupials of Australia. Finches are sparrow like small birds, about 14 species in Galapagos Islands.

Q17 Or, What is biotechnology? Describe the application of Biotechnology in Medicines. 2+3=5

Q17 Or ANS: Biotechnology is concerned with the utilization of microorganisms, plants and animal cells to generate useful product.

Application of biotechnology in the field of medicine are as follows:

(i) Treatment of diseases: Various drugs from the treatment of various diseases are also manufactured using biotechnology. Treatment of a disease can also be affected via gene therapy. Various drugs produced through biotechnology are Insulin, Interferons, Growth Hormones (prototrophin in USA and Somatonorm in UK) human blood clotting factor VIII: C, immunogenic proteins etc.

The ultimate goal of the gene therapy is the gene replacement therapy. At present the current strategy for gene therapy largely centers around gene augmentation i.e. replacement of defective or missing gene by introducing a foreign gene. Live audino viruses are being used, in the US military personnel as the vaccine to sure lung disorders. In 1992, adopting IVF technology (in vitro fertilization technology) Dr. A. Hadnyside or London got success in producing a genetically engineered female baby (C.O. Brein), whose parents transmitted the genetic disease (crystic fibrosis) in earlier for babies, who died later on. But this genetically engineered body is neither sufferer nor carrier of the disease.

(ii) **Forensic Medicines:** Forensic medicine is used for the identification of criminals such as murderers and rapist: reuniting the lost children; solving disputed problems of parentage, etc., with the help of DNA finger printing.

(iii) **Development of Vaccine for Immunity:** Vaccines are chemical substances prepared from the proteins (antigens) of the other animals which confer immunity to particularly virus.

18. What is Acquired Immuno Deficiency Syndrome? Give an account of its pathogen, transmission, etiology, diagnosis and remedy. Suggest measures for its prevention.

Q18 ANS: Acquired Immuno Deficiency syndrome is a kind of secondary immune deficiency disease whose infection takes place by Human immune-deficiency virus. HIV is a kind of retrovirus which contains a protein coat to cover its RNA. The normal immune system of infected human being gets distorted. As a result even ordinary infection leads to lethal condition.

Mode of Transmission: Various modes of transmission of HIV are (1) unprotected sexual intercourse (2) infected blood transfusion (3) use of contaminated hypodermic needles or syringe (4) Infected organ transplantation (5) from infected mother to baby during parturition (6) breast feedingby infected woman.

Diagnosis: ELISA test and western Blottest are the most effective diagnostic tools to test the AIDS. Other kind of diagnostic methods are do blot, latex agglutination test, particle agglutination test etc.

Symptoms: (1) HIV attacks helper T cells of adaptive immunity and reduces their number. As a result adaptive immune systems of the person becomes very weak. (2) Swelling of lymph nodes known as lymphadenopathy (3) Lymphoma (4) Excessive loss of platelets in blood leading to internal hemorrhage. (5) Deterioration in brain (6) Loss of memory and power of thinking (7) Appearance of several wounds in skin which change to skin cancer (8) Infection of pneumonia in lungs.

Treatment: In Indian Medicine Company 'Cipla' has launched three effective medicines against AIDS Stavudine, Lamiyudin, Nevirapine.

Q18 Or, What do you mean by Biodiversity? What is the importance of species Biodiversity in Ecosystem. Describe main reasons for depletion of Biodiversity.

Q18 Or ANS: Biodiversity is the variability among the living organisms from all sources including terrestrial, marine and other aquatic ecosystem.

In nature both the number and kind of species as well as the number of individuals per species vary leading to greater diversity.

The cause for biodiversity depletion may be man-made or natural. Natural causes include flood, landslides earthquakes, diseases etc. Man-made causes are anthropocentric causes.