

Instructions

Attempt only 40 questions out of the given 50 questions. Each question carries 5 marks. One mark will be deducted for a wrong answer.

Full Marks: 200

(Time: 45 Minutes)

1. Match the column-I with column-II.

Column-I		Column-II	
A.	α -1 antitrypsin	(i)	Molecular diagnosis
B.	Rosie cow	(ii)	Mice
C.	Polio vaccine	(iii)	Alpha lactalbumin
D.	PCR	(iv)	Emphysema

Choose the **correct** answer from the options given below:

- (a) A-(iv), B-(iii), C-(ii), D-(i) (b) A-(i), B-(ii), C-(iii), D-(vi)
(c) A-(ii), B-(iv), C-(i), D-(iii) (d) A-(iv), B-(ii), C-(iii), D-(i)

2. Match the items in Column-I with the correct items in Column-II.

Column-I		Column-II	
A.	Gene 'a'	(i)	β -galactosidase
B.	Gene 'y'	(ii)	Transacetylase
C.	Gene 'r'	(iii)	Permease
D.	Gene 'z'	(iv)	Repressor protein

Choose the **correct** answer from the options given below:

- (a) A-(ii), B-(iii), C-(iv), D-(i) (b) A-(iii), B-(iv), C-(i), D-(ii)
(c) A-(iv), B-(i), C-(ii), D-(iii) (d) A-(ii), B-(i), C-(iv), D-(iii)

3. Arrange the following scientists in the order they made significant contributions to genetics:

- A. Oswald Avery identifies DNA as the 'transforming principle'.
B. Frederick Griffith demonstrates the transforming principle in bacteria.
C. The Human Genome Project is completed.
D. Rosalind Franklin takes the first photo of DNA using X-ray diffraction.

Choose the **correct** answer from the options given below:

- (a) A, B, C, D (b) B, A, D, C (c) C, B, A, D (d) D, C, B, A

4. Match the following

List-I		List-II	
A.	ABO blood group	(i)	Dihybrid cross
B.	Law of segregation	(ii)	Monohybrid cross
C.	Law of independent assortment	(iii)	Base pairs substitution
D.	Gene mutation	(iv)	Multiple allelism

Choose the **correct** answer from the options given below:

- (a) A-(ii), B-(i), C-(iv), D-(iii) (b) A-(ii), B-(iii), C-(iv), D-(i)
(c) A-(iv), B-(i), C-(ii), D-(iii) (d) A-(iv), B-(ii), C-(i), D-(iii)

5. Select the **correct** statements about Assisted Reproductive Technologies (ART):

- A. *In vitro* fertilisation (IVF) involves fertilisation outside the body and embryo transfer (ET) into the uterus.
B. Zygote Intra Fallopian Transfer (ZIFT) involves transferring embryos with more than 8 blastomeres into the uterus.
C. Intra Cytoplasmic Sperm Injection (ICSI) is a technique where a sperm is directly injected into an ovum.
D. Artificial insemination (AI) can only be performed by introducing semen into the vagina.

Choose the **correct** answer from the options given below:

- (a) A and C only (b) B and D only
(c) A, B, and C (d) A, C, and D

6. Match the following List.

List-I		List-II	
A.	Saheli	(i)	Intra uterine device
B.	Diaphragms	(ii)	Prevent ovulation and implantation
C.	Spermicides	(iii)	Prevent sperms passing through the cervix
D.	Lippes Loop	(iv)	Sperm killing agent

Choose the **correct** answer from the options given below:

- (a) A-(i), B-(ii), C-(iv), D-(iii) (b) A-(ii), B-(iii), C-(iv), D-(i)
(c) A-(ii), B-(iii), C-(i), D-(iv) (d) A-(iv), B-(iii), C-(ii), D-(i)



7. Match the regions with their biodiversity.

Column-I		Column-II	
A.	Tropics	(i)	High biodiversity
B.	Temperate regions	(ii)	Low biodiversity
C.	Polar areas	(iii)	Moderate biodiversity

Choose the **correct** answer from the options given below:

- (a) A-(i), B-(ii), C-(iii) (b) A-(iii), B-(i), C-(ii)
(c) A-(ii), B-(iii), C-(i) (d) A-(i), B-(iii), C-(ii)

8. Sperm production takes place in _____

- (a) Seminiferous tubule (b) Epididymis
(c) Androgen (d) Vas deferens

9. Arrange the following scientific contributions to the theory of evolution in their chronological order:

- A. Charles Darwin publishes "On the Origin of Species."
B. Alfred Russel Wallace independently conceived the theory of natural selection.
C. Jean-Baptiste Lamarck proposes the theory of inheritance of acquired characteristics.
D. The modern synthesis of evolutionary theory integrates genetics with evolution.

Choose the **correct** answer from the options given below:

- (a) C, A, B, D (b) C, B, A, D (c) A, B, C, D (d) B, A, C, D

10. The duct which carries sperms from testis to epididymis is

- (a) Vasa efferentia (b) Vasa deferentia
(c) Ureter (d) Seminiferous tubules

11. Select the **correct** statements about the male reproductive system:

- A. The testes are located outside the abdominal cavity in a pouch called the scrotum.
B. Spermatogenesis occurs at a temperature higher than the normal internal body temperature.
C. Leydig cells in the testes are responsible for the synthesis and secretion of androgens.
D. The vas deferens receives a duct from the seminal vesicle and opens into the urethra as the ejaculatory duct.

Choose the **correct** answer from the options given below:

- (a) A, C, and D only (b) A and B only
(c) B, C, and D only (d) All are correct

12. Which of the following hormones is **not** a secretory product of human placenta?

- (a) hCG (b) Prolactin
(c) Estrogen (d) Progesterone

13. Side effects of anabolic steroids in females include

- A. Masculinisation
B. Aggressiveness
C. Mood swings, depression
D. Abnormal menstrual cycle
E. Excessive facial and body hair

Choose the **correct** answer from the options given below:

- (a) A, B and C (b) A, B, C and D
(c) B, C, D and E (d) A, B, C, D and E

14. Prenatal defects in the foetus can be detected by _____

- (a) MRI (b) Laparoscopy
(c) Genetic engineering (d) Amniocentesis

15. C-peptide of human insulin is

- (a) A part of mature insulin molecule
(b) Responsible for the formation of disulphide bridges
(c) Removed during maturation of pro-insulin to insulin
(d) Responsible for its biological activity

16. Hormone releasing IUDs are

- (a) Progestasert (b) Lippes loop
(c) Multiload 375 (d) None of above

17. Match the biological control agents in Column-I with their target pests or roles in Column-II:

Column-I (Control Agents)		Column-II (Targets/Roles)	
A.	Ladybird	(i)	Control butterfly caterpillars
B.	<i>Bacillus thuringiensis</i>	(ii)	Attack insects and other arthropods
C.	<i>Trichoderma</i>	(iii)	Control of aphids
D.	Baculoviruses	(iv)	Effective biocontrol agents of several plant pathogens.

Choose the **correct** answer from the options given below:

- (a) A-(i), B-(ii), C-(iii), D-(iv) (b) A-(ii), B-(iv), C-(i), D-(iii)
(c) A-(iii), B-(i), C-(iv), D-(ii) (d) A-(iv), B-(iii), C-(ii), D-(i)

18. Mendel selected how many true breeding pea plants?

- (a) 12 (b) 13 (c) 14 (d) 15

19. Assess the truthfulness of the statements concerning the female reproductive cycle and select the **correct** ones:

- A. Cyclical reproductive changes in non-primate mammals are termed the oestrus cycle.
B. The first menstruation commences at puberty and is known as menopause.
C. An absence of menstrual periods can suggest the possibility of pregnancy.
D. Regular menstrual cycles happen from the initial period at puberty until their cessation at menopause.

Choose the **correct** answer from the options given below:

- (a) A and B only (b) A, B, and C only
(c) A, C and D only (d) A and D only

20. Assess the following statements and select the **correct** ones:

- A. The pro-hormone insulin does not contain an extra stretch of C-peptide.
B. A-peptide and B-peptide chains of insulin were produced separately in *E. coli*, extracted, and combined by creating a disulfide bond between them.
C. Insulin used for treating diabetes was extracted from cattle and pigs, in the earlier times.
D. Pro-hormone insulin needs to be processed for converting into a mature and functional hormone.
E. Some patients develop allergic reactions to animal insulin.

Choose the **correct** answer from the options given below:

- (a) B, C, D and E only (b) B only
(c) A and D only (d) C and D only

21. Which of the following is the **correct** sequence of events occurring in sexual reproduction?
- (a) Gametogenesis-Syngamy-Embryogenesis-Zygote
(b) Syngamy-Gametogenesis-Zygote-Embryogenesis
(c) Gametogenesis-Syngamy-Zygote-Embryogenesis
(d) Zygote-Embryogenesis-Syngamy-Gametogenesis
22. In Mendel's experiments, colour of seed coat, colour of flower, position of flower, colour of pod, height of stem are called
- (a) Alleles (b) Genotype
(c) Phenotype (d) Factors
23. Continuous and discontinuous fragments of DNA are formed during
- (a) Transduction (b) Transcription
(c) Replication (d) Translation
24. According to Hugo de Vries, the mechanism of evolution is
- (a) Multiple step mutations (b) Saltation
(c) Phenotypic variations (d) Minor mutations
25. Which of the following is a purine?
- (a) Cytosine (b) Uracil (c) Thymine (d) Adenine
26. Which of the following is **not** a cause for loss of biodiversity?
- (a) Destruction of habitat
(b) Invasion by alien species
(c) Keeping animals in zoological parks
(d) Over-exploitation of natural resources
27. A nucleoside differs from a nucleotide in not having a _____.
- (a) Phosphate (b) Sugar
(c) Phosphate & sugar (d) Nitrogen base
28. **Statement-I:** During embryo sac formation, a functional megaspore divides by complete mitotic division.
Statement-II: In these mitotic divisions, karyokinesis is immediately followed by cytokinesis.
- (a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

Read the passage carefully and give the answer to the next five questions (Q. 29 - Q. 33):

X is any attribute of the organism that enables the organisms to survive and reproduce in its habitat. It has evolved over a long evolutionary time and is genetically fixed. In the table some organisms and their attributes are given as follows:

Organisms	Attributes (X)
P	Lives in North American deserts
Q	Have flattened stems
R	Has thick layer of insulating fat under the skin

29. Which of the following statements about organism P is **incorrect**?
- (a) Perform internal fat oxidation
(b) Produce water as by product
(c) They have the ability to concentrate its urine
(d) They use maximum volume of water to remove excretory products

30. Which of the following is **correct** match regarding organism R and its habitat?
- (a) Tundra-Leopard Seals (b) Tropical rain forest-Deer
(c) Grassland-Bighorn sheep (d) Desert-Camel
31. What could be the habitat of organism Q where it lives?
- (a) High annual rainfall and higher temperature
(b) Low annual rainfall and low temperature
(c) Low annual rainfall and high temperature
(d) High annual rainfall and low temperature
32. What is the primary benefit of flattened stems in Organism Q?
- (a) Increases photosynthesis surface
(b) Prevents water loss
(c) Provides structural support
(d) Increases oxygen intake
33. Organism R have
- (a) Shorter ears and limbs
(b) Longer ears and shorter limbs
(c) Shorter ears and longer limbs
(d) Longer ears and limbs

Read the passage carefully and give the answer to the next five questions (Q. 34 - Q. 38):

Drug abuse means using harmful substances like alcohol or illegal drugs in a way that is bad for the health and/or causes trouble in life. People of all ages and backgrounds can face this problem, and it can lead to serious issues like health problems, difficulties at school or work, etc. Some drug abused patients P, Q, R and S visited to the doctor. On the basis of symptoms and diagnostic tests a table is being prepared.

Patient	Type of drug	Examples	Effect
A.	Sedative	P	Help cope with mental illnesses like depression and insomnia, but can be abused.
B.	Opioids	Morphine and Heroin	Suppress brain activity and relaxed pain
C.	Stimulants	Amphetamines, caffeine, cocaine	R
D.	Hallucinogens	S	Restlessness and shakiness

34. Which of the following drugs can be placed in place of P?
- (a) Smack and Ganja
(b) Heroin and methadone
(c) Barbiturates and benzodiazepines
(d) Marijuana and smack
35. Which of the given effects (R) is observed on taking stimulants like amphetamines, caffeine and cocaine?
- (a) Alter thoughts, feeling and perceptions
(b) Lessen tension and anxiety without sedation
(c) Suppress brain activity, relieve pain, stimulate nervous system
(d) Make person more wakeful, alert and active, cause excitement



36. Which of the following drugs are also being abused by some sports persons?

- (a) Smack (b) Cannabinoids
(c) Morphine (d) Opiates

37. 'Note the relationship between the third and fourth words and suggest a suitable word for the first place from the given options.

_____ : Heroin :: Stimulants : Caffeine.

- (a) Hypnotics (b) Hallucinogens
(c) Depressants (d) Stimulants

38. Given below are two statements: one is labeled as assertion (A) and the other is labeled as Reason (R).

Assertion (A): Heroin is commonly called as smack.

Reason (R): Heroin is obtained by acetylation of cocaine.

- (a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but Reason is False.
(d) Assertion is False but Reason is True.

39. Arrange the following steps involved in the isolation of DNA in the correct sequence:

- A. Precipitation of DNA with alcohol.
B. Lysis of the cell membrane to release cellular contents.
C. Removal of proteins by enzymatic treatment.
D. Centrifugation to separate DNA from other cellular debris.
Choose the **correct** answer from the options given below:

- (a) B, C, D, A (b) D, B, C, A
(c) C, D, A, B (d) A, B, C, D

40. Which of the following statements about PCR are **correct**?

- A. PCR is a technique used to amplify small segments of DNA.
B. *Taq* polymerase is used in PCR as it is denatured at high temperatures.
C. PCR involves denaturation, annealing, and extension steps.
D. PCR can only amplify DNA fragments larger than 10,000 base pairs.

Choose the **correct** answer from the options given below:

- (a) A and C only (b) B and D only
(c) A, B, and C only (d) A, B, and D only

41. Match the terms in Column-I with their corresponding examples in Column-II:

Column-I		Column-II	
A.	Co-dominance	(i)	Human skin color
B.	Incomplete dominance	(ii)	Flower color in snapdragon in heterozygous condition
C.	Polygenic inheritance	(iii)	Eye color and body color genes on X chromosomes in <i>Drosophila</i>
D.	Linkage	(iv)	ABO blood group in humans

Choose the **correct** answer from the options given below:

- (a) A-(iv), B-(i), C-(ii), D-(iii) (b) A-(iii), B-(iv), C-(i), D-(ii)
(c) A-(iv), B-(ii), C-(i), D-(iii) (d) A-(i), B-(iv), C-(iii), D-(ii)

42. Match column-I with column-II.

Column-I		Column-II	
A.	$\phi \times 174$ DNA	(i)	3.3×10^9 bp
B.	λ -phage DNA	(ii)	4.6×10^6 bp
C.	<i>E. coli</i> DNA	(iii)	48502 bp
D.	Haploid content of human DNA	(iv)	5386 bases

Choose the **correct** answer from the options given below:

- (a) A-(iv), B-(iii), C-(ii), D-(i) (b) A-(i), B-(ii), C-(iii), D-(iv)
(c) A-(ii), B-(iii), C-(iv), D-(i) (d) A-(i), B-(iv), C-(ii), D-(iii)

43. In *lac* operon model, lactose function as:

- (a) Inducer that binds to repressor protein
(b) Repressor that binds to operator gene
(c) Inducer that binds to operator gene
(d) Co-repressor that binds to repressor protein

44. Select the **correct** statements about pollen grains:

- A. Pollen grains are typically spherical, measuring about 25-50 micrometers in diameter.
B. The outer layer of the pollen grain, the exine, is composed of cellulose and is highly resistant.
C. Germ pores on the pollen grain exine are areas where sporopollenin is absent.
D. Mature pollen grains contain two cells: the vegetative cell and the generative cell.

Choose the **correct** answer from the options given below:

- (a) A, C, and D only (b) B and D only
(c) A, B, and C (d) All are correct

45. Which biomolecule is synthesised in the experiment performed by Stanley Miller?

- (a) Virus (b) Protein
(c) Amino acid (d) Cell

46. Which pair of bacteria are most useful in genetic engineering?

- (a) *Rhizobium* and *Azotobacter*
(b) *Escherichia* and *Agrobacterium*
(c) *Lactobacillus* and *Azotobacter*
(d) *Nitrosomonas* and *Klebsiella*

47. Identify the **correct** statement:

- (a) Primary productivity remains the same in different types of individuals.
(b) Primary productivity depend on the plant species inhabiting a particular area.
(c) Primary productivity does not depend on environmental factors, availability of nutrients and photosynthetic capacity of plants.
(d) The rate at which decomposers degrade biomass or organic matter per unit area per unit time is the basic measure of an ecosystem's productivity.

48. Statement-I: The Amazon rain forest is called the lungs of the planet.

Statement-II: This forest is quite huge and species rich as well, it contributes to minor amount of oxygen production too.

- (a) Both Statement-I and Statement-II are correct.
- (b) Both Statement-I and Statement-II are incorrect.
- (c) Statement-I is correct & Statement-II is incorrect.
- (d) Statement-I is incorrect & Statement-II is correct.

49. Which of the following is used in Swiss cheese?

- (a) *Saccharomyces cerevisiae*
- (b) *Propionibacterium sharmanii*
- (c) Streptokinase
- (d) *Monascus purpureus*

50. ELISA is based on

- (a) Antigen-Antibody interaction
- (b) Antigen-Antigen interaction
- (c) Antibody-Antibody interaction
- (d) All of these



Answer Key

(Scan QR Code for Detailed Explanations)

- | | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (a) | 2. (a) | 3. (b) | 4. (d) | 5. (a) | 6. (b) | 7. (d) | 8. (a) | 9. (b) | 10. (a) |
| 11. (a) | 12. (b) | 13. (d) | 14. (d) | 15. (c) | 16. (a) | 17. (c) | 18. (c) | 19. (c) | 20. (a) |
| 21. (c) | 22. (c) | 23. (c) | 24. (b) | 25. (d) | 26. (c) | 27. (a) | 28. (b) | 29. (d) | 30. (a) |
| 31. (c) | 32. (b) | 33. (a) | 34. (c) | 35. (d) | 36. (b) | 37. (c) | 38. (c) | 39. (a) | 40. (a) |
| 41. (c) | 42. (a) | 43. (a) | 44. (a) | 45. (c) | 46. (b) | 47. (b) | 48. (b) | 49. (b) | 50. (a) |