

PUMDET-2023

Subject : **HEALTH SCIENCES**

(Booklet Number)



Duration : **90** Minutes

No. of Questions : **50**

Full Marks : **100**

INSTRUCTIONS

1. All questions are of objective type having four answer options for each. Only one option is correct. Correct answer will carry full marks **2**. In case of incorrect answer or any combination of more than one answer, $\frac{1}{2}$ mark will be deducted.
2. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C or D.
3. Use only **Black/Blue ink ball point pen** to mark the answer by complete filling up of the respective bubbles.
4. Mark the answers only in the space provided. Do not make any stray mark on the OMR.
5. Write question booklet number and your roll number carefully in the specified locations of the **OMR Sheet**. Also fill appropriate bubbles.
6. Write your name (in block letter), name of the examination centre and put your signature (as is appeared in Admit Card) in appropriate boxes in the OMR Sheet.
7. The OMR Sheet is liable to become invalid if there is any mistake in filling the correct bubbles for question booklet number/roll number or if there is any discrepancy in the name/signature of the candidate, name of the examination centre. The OMR Sheet may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.
8. Candidates are not allowed to carry any written or printed material, calculator, pen, docu-pen, log table, wristwatch, any communication device like mobile phones, bluetooth devices etc. inside the examination hall. Any candidate found with such prohibited items will be **reported against** and his/her candidature will be summarily cancelled.
9. Rough work must be done on the question booklet itself. Additional blank pages are given in the question booklet for rough work.
10. Hand over the OMR Sheet to the invigilator before leaving the Examination Hall.
11. Candidates are allowed to take the Question Booklet after examination is over.

Signature of the Candidate : _____
(as in Admit Card)

Signature of the Invigilator : _____



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SPACE FOR ROUGH WORK



BIOLOGICAL SCIENCES

1. The mammalian counterpart of the avian bursa of Fabricius is the
 - (A) Spleen
 - (B) Gut-Associated Lymphoid Tissue (GALT)
 - (C) Bone marrow
 - (D) Thymus

2. Conduction velocity is maximum in
 - (A) S.A. node
 - (B) A.V. node
 - (C) Bundle of His
 - (D) Right ventricle

3. In logistic equation when the rate of change in population number (dN/dt) will be maximum ?
 - (A) When $N = K$
 - (B) When $N = 0$
 - (C) When $N > K$
 - (D) When $N = K/2$

4. Which of the following cells belong to myeloid progenitor ?
 - (A) Natural killer cells
 - (B) B cells
 - (C) Mast cells
 - (D) T cells

5. Which type of selection is observed in industrial melanism exhibited by *Biston betularia* ?
 - (A) Stabilising
 - (B) Disruptive
 - (C) Directional
 - (D) Artificial

6. In the classic experiment on the formation of amino acids, Urey & Miller passed an electric discharge in a mixture of
 - (A) Steam, CH_4 , H_2 and NH_3
 - (B) CH_4 , CO_2 , O_2 and H_2
 - (C) NH_3 , O_2 , H_2 and CH_4
 - (D) CH_4 , H_2 , N_2 and Steam



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7. Potency of medication is evaluated by
(A) ED_{50} (B) TD_{50} (C) LD_{50} (D) CD_{50}
8. Which of the following plasma membrane receptors activate signalling pathways usually by forming dimers resulting in protein phosphorylation upon ligand – binding ?
(A) Steroid hormone receptor (B) Receptor Tyrosine Kinase
(C) G-Protein coupled receptors (D) Ligand gated ion channels
9. The type of bonds present in a protein having quaternary structure are
(A) Different from those found in its tertiary structure
(B) Principally covalent in nature
(C) Same as those found in its tertiary structure
(D) Principally linked by C-N bonds
10. The highest volume of air which can be moved in and out of the respiratory system is the
(A) Tidal volume (B) Vital capacity
(C) Ventilatory volume (D) Pulmonary capacity
11. Which of the following chemicals is produced by kidney ?
(A) Angiotensinogen (B) Bicarbonate ions
(C) Sodium ions (D) Vitamin C
12. Commensalism is an interaction between two species in which
(A) Both are harmed.
(B) Both are benefitted.
(C) One is benefitted and the other is neither benefitted nor harmed.
(D) One is benefitted and the other is harmed.



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13. Electron flow through the Fe-S clusters present across the mitochondrial electron transport chain complexes according to
(A) Increasing redox potential (B) Decreasing redox potential
(C) ATP hydrolysis (D) Proton motive force
14. Which of the following is not a typical characteristic of an 'r' – selected species ?
(A) Large size
(B) Many small offspring
(C) A large allocation of resources to reproduction
(D) Early reproductive maturity
15. Surface marker present in cytotoxic T cells
(A) CD4 (B) CD8 (C) CD11 (D) CD45
16. Hormone that can replace vernalization _____.
(A) Cytokinins (B) Gibberellins (C) Auxin (D) Ethylene
17. Column – A lists 4 organs/systems (1 to 4) and Column – B lists a germ cell layer against each organ/system. Below the table there are 4 options (A, B, C and D), each with 4 different combinations of organ/system vs. germ layer. Find the correct option that lists all correct combinations :

Column - A				Column – B	
1.	Muscles and bones			a.	Ectoderm
2.	Lungs			b.	Mesoderm
3.	Connective tissues			c.	Endoderm
4.	Nervous system			d.	Mesoderm
	1	2	3	4	
(A)	b	c	a	a	
(B)	a	b	c	b	
(C)	b	c	d	a	
(D)	b	c	a	b	



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24. In mammals, which of the following cleavage patterns is operative in the process of blastocyst formation ?
- (A) Radial (B) Spiral
(C) Bilateral (D) Rotational
25. Which of the following is the key hormone involved in milk production ?
- (A) Prolactin (B) Estrogen
(C) Oxytocin (D) Progesterone
26. The method in which the cells are freeze dehydrated is called
- (A) Pasteurization (B) Dessication
(C) Disinfection (D) Lyophilization
27. Beta lactams inhibit bacterial
- (A) Cell wall synthesis (B) Protein synthesis
(C) DNA replication (D) Cell division
28. In an experiment, the expected double cross over frequency was calculated as 0.022 but in reality, it was observed to be only 0.012 recombination frequency. What is the phenomenon resulting in this ?
- (A) Interference (B) Coincidence
(C) Penitence (D) Expressivity
29. For the tree and grassland ecosystem, pyramid of biomass is
- (A) Upright (B) Inverted
(C) Spindle shaped (D) Urn shaped



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30. Choose the wrong one from the following :
- (A) Nearly twenty types of amino acids participate in protein synthesis.
 - (B) Sixty four codons out of sixty four, code only for amino acids.
 - (C) Codon usage bias varies from species to species in terms of functional implications for the control of translation.
 - (D) Genetic code is non-overlapping.
31. Which of the following is an example of RNA editing ?
- (A) Removal of introns from an RNA transcript.
 - (B) Degradation of an RNA molecule by nuclease.
 - (C) Alteration of nucleotide sequence of an RNA molecule.
 - (D) Capping of 5' end of an RNA transcript.
32. Ethyl Methane Sulphonate (EMS) is
- (A) A deaminating agent
 - (B) An alkylating agent
 - (C) An intercalating agent
 - (D) A base analogue
33. Rho protein in transcription termination acts as
- (A) A helicase that actively breaks base pairs between the template and transcript.
 - (B) A DNA binding protein that blocks the movement of RNA polymerase down the template.
 - (C) A subunit of RNA polymerase that binds to RNA hairpins and stalls transcription.
 - (D) A nuclease that degrades 3' ends of the RNA transcript.
34. The co-repressor in the *trp* operon is
- (A) Tyrosine
 - (B) Tryptophan
 - (C) Glucose
 - (D) Galactose

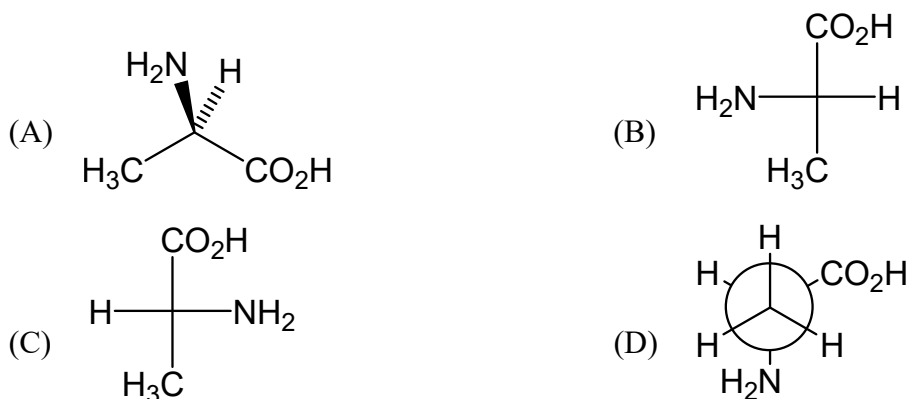


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CHEMISTRY

41. What is the maximum number of atoms of phenylacetylene that can lie on a line ?
 (A) 5 (B) 4 (C) 6 (D) 14

42. The Fischer projection formula for (*R*)-alanine is



43. Which one of the following is not a carbon-carbon bond forming reaction ?

- (A) Cannizzaro reaction (B) Aldol reaction
 (C) Friedel-Crafts reaction (D) Diels-Alder reaction

44. The number of covalent bonds of an unsaturated alcohol will remain same by carrying out

- (A) addition reaction (B) elimination reaction
 (C) oxidation (D) substitution reaction

45. Aniline $C_6H_5NH_2$ is a weak organic base in aqueous solution. A solvent in which aniline would become a strong base is

- (A) benzene (B) liquid NH_3 (C) ethanol (D) acetic acid

46. If a nuclide in Group IA of the periodic table undergoes radioactive decay by emitting positron, what is the valence expected for the resulting element ?

- (A) 1 (B) 2 (C) 3 (D) 0



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47. The shape of PCl_5 and IF_5 are respectively
- (A) both are trigonal bipyramidal.
 - (B) both are square pyramidal.
 - (C) trigonal bipyramidal and square pyramidal.
 - (D) square pyramidal and trigonal bipyramidal.
48. Number of protons contained in 224 mL deuterium gas (assuming ideal behaviour) at NTP is
- (A) 6.023×10^{23}
 - (B) 12.046×10^{23}
 - (C) 16.023×10^{21}
 - (D) 12.046×10^{21}
49. The first ionisation potential of Li, Be and C are 5.4, 9.3 and 11.3 eV. What do you predict for the ionisation potential of B ?
- (A) 10.6 eV
 - (B) 8.3 eV
 - (C) 4.5 eV
 - (D) 12.5 eV
50. The following equilibrium can exist only under very special conditions.
- $$\text{C}_{(s, \text{diamond})} \rightleftharpoons \text{C}_{(s, \text{graphite})}$$
- [Densities of diamond and graphite are 3.5 and 2.3 g/cm^3 respectively]
- Predict the effect upon the following reaction equilibrium of (i) increased pressure, (ii) increased temperature
- (A) (i) favours forward reaction (ii) favours backward reaction.
 - (B) (i) favours backward reaction (ii) favours backward reaction.
 - (C) (i) favours backward reaction (ii) favours forward reaction.
 - (D) (i) favours forward reaction (ii) favours forward reaction.



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