

PUMDET-2024

Subject : Health Sciences

4031700893

(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 Sheet.
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 : \_\_\_\_\_

Health Science



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**SPACE FOR ROUGH WORK**

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1. Which of the following chemical mutagens is likely to cause GC → AT transition ?
- (A) 5-bromouracil  
(B) Hydroxylamine  
(C) 2-aminopurine  
(D) Methyl methane sulfonate (MMS)
2. The ability of a bacterial cell to take up DNA fragments from the external environment is called
- (A) Fitness  
(B) Fecundity  
(C) Competence  
(D) Hfr
3. What is the fate of accumulation of acetyl – CoA in liver during starvation ?
- (A) It is converted into oxaloacetate  
(B) It leads to fatty acid synthesis  
(C) It forms ketone bodies  
(D) It gives energy
4. Which one of the following rRNA undergoes least post-transcriptional processing ?
- (A) 28S  
(B) 18S  
(C) 5.8S  
(D) 5S



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5. Cytological changes such as increased ratio of nuclear versus cytoplasmic size is termed as
- (A) Anaplasia (B) Dysplasia  
(C) Metaplasia (D) Hyperplasia
6. Which histone molecule produces novel binding sites for protein components to the kinetochore ?
- (A) H3 (B) H4  
(C) H2A (D) CENP-A
7. In haplodiploid sex determination of bees
- (A) males are sterile (B) males are haploid  
(C) males are diploid (D) males are either haploid or diploid
8. Which one of the following is valid for Non-Detriment Findings ?
- (A) Species confined in a particular geographical region  
(B) Keystone species of an ecosystem  
(C) Flagship and indicator species of an ecosystem  
(D) Export of specimen will not impact negatively on the survival of that species in the wild
9. Which of the following functions is not performed by transposase ?
- (A) Restriction of the IS element  
(B) Integration of the transposons  
(C) Formation of the RNA intermediate  
(D) Restriction of the host genome





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10. Which one of the following families shows 'Onagrad type' of embryogény ?

- (A) Magnoliaceae (B) Campanulaceae  
(C) Caryophyllaceae (D) Amaranthaceae

11. Name the sigma factor which is used for promoter recognition.

- (A) Sigma 32 (B) Sigma 70  
(C) Sigma 60 (D) Sigma 40

12. Which of the following is true for RNA polymerase activity ?

- (A) DNA-dependent DNA synthesis  
(B) Direct repair  
(C) DNA-dependent RNA synthesis  
(D) RNA-dependent RNA synthesis

13. Match the Column - I with Column - II.

Column - I	Column - II
1. <i>Cryptomeria-Abies</i> type shoot apex	(a) a single apical cell is present
2. Shoot apex of <i>Equisetum</i>	(b) the cambium like transitional zone is absent
3. <i>Opuntia</i> type shoot apex	(c) a group of cells with low mitotic activity is present
4. Quiescent centre in root apical meristem	(d) the cambium like transitional zone is present

- (A) 1-(b), 2-(d), 3-(a), 4-(c) (B) 1-(b), 2-(a), 3-(d), 4-(c)  
(C) 1-(a), 2-(b), 3-(d), 4-(c) (D) 1-(b), 2-(c), 3-(d), 4-(a)



14. Which of the following statement is true ?
- (A) Amylose is a linear polysaccharide and amylopectin is a branched polysaccharide
  - (B) Glycogen contains amylose and amylopectin
  - (C) Starch has a glycogen in its core
  - (D) Amylose is a branched polysaccharide and amylopectin is a linear polysaccharide
15. Which of the following refers to the type of interaction between two populations in which one population is benefited and the other is not affected ?
- (A) Mutualism
  - (B) Commensalism
  - (C) Parasitism
  - (D) Neutralism
16. All of the following are modes of action of antiviral drugs except inhibition of
- (A) protein synthesis at 70S ribosomes
  - (B) DNA synthesis
  - (C) RNA synthesis
  - (D) uncoating
17. Which type of radiation is commonly used for the preservation of foods ?
- (A) Ionizing
  - (B) Non ionizing
  - (C) Radio wave
  - (D) Microwave



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18. The global regulatory mechanism in bacteria that inhibits the expression and activities of functions for the use of secondary carbon sources when a preferred carbon source is present, is known as
- (A) Carbon catabolite repression
  - (B) Ping pong mechanism
  - (C) Anti-homeostatic activity
  - (D) Substrate sequestration matrix
19. Gram-negative bacteria are more resistant to antibiotics than Gram-positive bacteria due to the presence of
- (A) thin peptidoglycan layer
  - (B) outer lipopolysaccharide layer
  - (C) porin proteins
  - (D) teichoic acid
20. A molecular method used to localize genes on chromosomes or RNAs within cells using fluorescent probe is called
- (A) ISH
  - (B) FISH
  - (C) Southern Blot
  - (D) ELISA
21. Hypophosphatemia is caused by an X-linked dominant gene in human. If a hypophosphatemic man marries to a normal woman, which of their children will have hypophosphatemia ?
- (A) All the daughters
  - (B) Half of their daughters
  - (C) All of their sons
  - (D) Half of their sons



22. Which one of the following is the most suitable culture medium for mammalian primary cell culture ?
- (A) DMEM (B) M-199  
(C) PBS (D) RPMI-1640
23. There are 8 chromosomes (4 pairs) in a *Drosophila melanogaster* somatic cell. The linkage groups present in it are
- (A) one (B) two  
(C) four (D) eight
24. Identify the antibiotic among the following that belongs to the family of fluoroquinolones.
- (A) Cephalexin (B) Azithromycin  
(C) Sulphamethoxazole (D) Ciprofloxacin
25. Secondary metabolites such as glucosinolates and benzoxarinoids, produced by plants are called
- (A) Phytoalexins (B) Phytoanticipins  
(C) Phytochromes (D) Plantibodies
26. Lectins are
- (A) cell wall degrading enzymes  
(B) one type of bacterial lipo-polysaccharide  
(C) lipoprotein  
(D) carbohydrate binding (glyco) proteins





27. Interferons are
- (A) antibacterial proteins (B) antiviral polysaccharides  
(C) antiviral proteins (D) antiprotozoal polysaccharides
28. Upon ligand binding, which of the following plasma membrane receptors form dimers resulting in protein phosphorylation ?
- (A) Steroid hormone receptor (B) RTK  
(C) Ligand gated ion-channels (D) GPCR
29. The two heavy chains of human IgG<sub>2</sub> molecules are connected in the hinge region by
- (A) two disulfide bonds (B) eleven disulfide bonds  
(C) thirteen disulfide bonds (D) four disulfide bonds
30. Shannon-Weiner diversity index depends on
- (A) Species richness  
(B) Community evenness  
(C) Both species richness and evenness  
(D) Number of trophic levels
31. The habitat of Lion-tailed macaque is unique to
- (A) Western Ghats (B) Arunachal montane ecosystem  
(C) Sikkim (D) Andaman and Nicobar islands



32. Which part of the Hardy-Weinberg equation would you expect to decrease if inbreeding occurs ?
- (A)  $2pq$  (B)  $p^2$   
 (C)  $q^2$  (D)  $p^2$  and  $q^2$
33. Which one is not an example of parallel evolution ?
- (A) Old and New world porcupines  
 (B) Evolution of internal fertilization in sharks, some amphibians and amniotes  
 (C) Human bipedalism and evolution of a complex brain  
 (D) The eye of octopus and human
34. The phenomenon when a trait has been gained or lost independently in separate lineages over the course of evolution is termed as
- (A) Homology (B) Homoplasy  
 (C) Synapomorphy (D) Apomorphy
35. Which of the following remains closed during period of isometric contraction ?
- (A) Bicuspid and tricuspid valves only  
 (B) Semilunar valves only  
 (C) Eustachian and thebesian valves  
 (D) AV valves and semilunar valves



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36. Which of the following is neither reabsorbed nor secreted by tubular cells of nephron ?

- (A) Inulin
- (B) Urea
- (C) Uric acid
- (D) Glucose

37. Volume of air that will remain in the lungs after a normal expiration is

- (A) TV + IRV
- (B) ERV + RV
- (C) VC + RV
- (D) IRV + TV + ERV

38. The right shift of the oxygen dissociation curve occurs in all of the following conditions except increased

- (A) carbondioxide concentration
- (B)  $H^+$  concentration
- (C) 2, 3-DPG in blood
- (D)  $pO_2$

39. Which of the following acts as a shock absorber to cushion the tibia and the femur when they come together ?

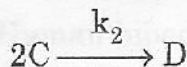
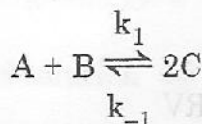
- (A) Ligament
- (B) Tendon
- (C) Disc
- (D) Cartilage



40. Heart burn is caused by

- (A) Regurgitation of acidic chyme
- (B) Inflammation of gastric epithelia
- (C) Inflammation of epicardium
- (D) Burning of heart

41. Elementary steps of a reaction are as follows :



If steady state approximation is applicable to C, the rate of product formation in the reaction is

- (A) proportional to [A] [B]
- (B) proportional to [A]<sup>2</sup> [B]<sup>2</sup>
- (C) proportional to [A]<sup>1/2</sup> [B]<sup>1/2</sup>
- (D) independent of [A] [B]

42. Which of the following is true for a negative catalyst ?

- (A) Negative catalyst blocks the usual pathway and forces the reaction to take up an alternative path with higher energy of activation.
- (B) Negative catalyst offers the reaction a pathway having higher energy of activation.
- (C) Negative catalyst decreases the rate of collisions and thereby reduces the reaction rate.
- (D) Negative catalyst by endothermally dissolving in the solvent decreases the temperature and thereby slows down the reaction.





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43. Which of the following quantities is concentration independent ?

- (A) Conductance
- (B) Specific conductance
- (C) Equivalent conductance
- (D) Equivalent conductance at infinite dilution

44. At 20 °C, the vapour pressure of two liquids X and Y which form an ideal solution are 70 torr and 20 torr respectively. If the mole fraction of X in solution is 0.5, mole fractions of X and Y in the vapour phase in equilibrium with solution are

- (A) 0.8 and 0.2
- (B) 0.78 and 0.22
- (C) 0.76 and 0.24
- (D) 0.82 and 0.18

45. The geometry of  $\text{Ni}(\text{CO})_4$  is :

- (A) square planar
- (B) distorted tetrahedral
- (C) regular tetrahedral
- (D) octahedral



46. Which one of the following molecules is  $sp^3d$  hybridized ?

- (A)  $XeO_3$  (B)  $XeOF_2$   
 (C)  $XeOF_4$  (D)  $XeF_4$

47. The ground state term symbol of a free  $d^2$  ion is :

- (A)  ${}^3F_2$  (B)  ${}^3F_3$   
 (C)  ${}^3F_4$  (D)  ${}^3P_2$

48. Which of the following organic molecule(s) will produce grey/black precipitate of Ag upon treatment with Tollens' reagent ?

- I. Vanillin
- II. Benzophenone
- III. Phenylhydroxylamine
- IV. Nitrobenzene

- (A) I only (B) I and III  
 (C) I and IV (D) III and IV

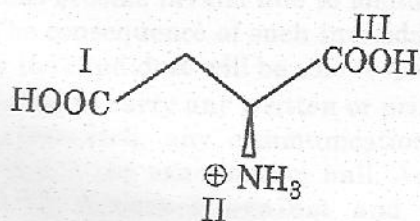


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49. Regarding aniline hydrochloride, consider the following statements and then choose the correct option :

- (i) It gives effervescence with saturated aqueous solution of  $\text{NaHCO}_3$ .
  - (ii) It gives a white precipitate with aqueous  $\text{AgNO}_3$  solution.
  - (iii) It responds to diazo-coupling reaction with alkaline  $\beta$ -naphthol solution after being treated with  $\text{NaNO}_2$  solution.
- (A) Only (i) is correct
  - (B) Both (i) and (iii) are correct, but (ii) is not.
  - (C) Both (ii) and (iii) are correct, but (i) is not.
  - (D) (i), (ii) and (iii), all are correct.

50. The correct order of acidity for the given compound is :



- (A)  $\text{III} > \text{I} > \text{II}$
- (B)  $\text{III} > \text{II} > \text{I}$
- (C)  $\text{I} > \text{III} > \text{II}$
- (D)  $\text{I} > \text{II} > \text{III}$

