

040/21

Question Booklet Alpha Code

A

	Question Booklet Sl. No.
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A

Total Number of Questions : 100	Time : 75 Minutes
Maximum Marks : 100	

INSTRUCTIONS TO CANDIDATES

1. The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. **A, B, C & D**.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator **IMMEDIATELY**.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.
6. The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.



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- What is the Point Group of Naphthalene ?
A) C_{2v} B) C_{2h} C) D_{2h} D) D_{2d}
- If a molecule is having the following symmetry element IR active vibrational modes are Raman inactive and vice versa
A) C_n B) S_n C) σ_v D) i
- Which of the following molecule does not show rotational spectrum ?
A) HCl B) IF C) CO D) H_2
- Number of Vibrational modes in CO_2 is
A) 4 B) 3 C) 2 D) 1
- If A and B are two operators which commute with one another, then the commutator operator, $[A, B]$ is called _____ operator.
A) Hermitian B) Linear C) Zero D) Laplacian
- For orbitals with $l \neq 0$, number of nodes in any radial function is given by
A) $n - l - 1$ B) $n - l$ C) $l - 1$ D) $n + l$
- For reactions having half life time 10^{-6} or less the method used for the study of fast reaction
A) Flash photolysis B) Pulse radiolysis
C) Stopped flow method D) Relaxation method
- Mean free path of a gas molecule is inversely proportional to
A) Temperature B) Pressure
C) Velocity D) Boltzmann constant
- At high substrate concentration, enzyme catalysed reaction becomes _____ order reaction.
A) Zero B) One C) Two D) Three
- Half life of a reaction doubles when initial concentration is reduced to half. What is the order of the reaction ?
A) Zero B) One C) Two D) Three
- Number of isomeric derivatives for neutral closo carborane, $C_2B_{10}H_{12}$ is
A) Two B) Three C) Five D) Four

22. The ratio of relative intensities of signals in the first order carbon NMR spectrum of CD_3Cl is
 A) 1 : 3 : 6 : 7 : 6 : 3 : 1 B) 1 : 2 : 1
 C) 1 : 4 : 6 : 4 : 1 D) 1 : 3 : 3 : 1
23. Configurations of carbon atoms C_3 and C_4 in D-ribose are
 A) R and S B) S and R C) S and S D) R and R
24. S and L value of ^{15}N is
 A) $\frac{1}{2}$ and 0 B) $\frac{3}{2}$ and 0 C) 1 and 0 D) $\frac{1}{2}$ and 1
25. pH of an aqueous solution containing $[\text{H}^+] = 3 \times 10^{-3} \text{ M}$ is
 A) 2.471 B) 2.523 C) 2.756 D) 3
26. Which of the following aqueous solutions (0.01 M) have the highest boiling point ?
 A) Glucose B) Urea C) NaCl D) ZnSO_4
27. Zero point energy of SHO whose vibrational frequency is ν , is given by
 A) $h\nu$ B) $h\nu/2$ C) $h\nu/3$ D) $h\nu/4$
28. Which hydrocarbon is known as Marsh gas ?
 A) Butane B) Propane C) Ethane D) Methane
29. Which of the following is not an ortho para directing group ?
 A) Methyl B) Hydroxy C) Amino D) Nitro
30. This compound is identified as the chief component of oil of winter green is
 A) Methyl salicylate B) Phenyl salicylate
 C) Acetyl salicylic acid D) Amino salicylic acid
31. Total yield in mitochondrial breakdown of pyruvate per glucose molecule is
 A) 25 ATP B) 28 ATP C) 30 ATP D) 36 ATP
32. Zellweger's syndrome is caused by
 A) β -oxidation B) α -oxidation
 C) ω -oxidation D) Both B) and C)
33. Which of the following is the inhibitor of complex III ?
 A) Rotenone B) Antimycin A C) Amytal D) Pteridicin A

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34. Match the following :
- | | |
|-----------------------|-------------------|
| 1. Southern blotting | A. Alwine |
| 2. Western blotting | B. E. M. Southern |
| 3. Northern blotting | C. A. Jeffrey |
| 4. DNA fingerprinting | D. Towbin |
- A) 1 – A, 2 – C, 3 – D, 4 – B B) 1 – B, 2 – D, 3 – A, 4 – C
C) 1 – B, 2 – A, 3 – D, 4 – C D) 1 – B, 2 – C, 3 – A, 4 – C
35. The lipoprotein possessing the highest quantity of phospholipid
A) HDL B) LDL C) VLDL D) Chylomicrons
36. To avoid ketosis, the total content of fat (F) must not exceed which of the following sum of carbohydrate (C) and protein (P) ?
A) C + P B) 2C + P C) 2C + 1/2P D) C + 2P
37. Fischer's lock and key model cannot explain
A) Inactivation due to denaturation B) Allosteric modulation
C) Competitive inhibition D) Saturation kinetics
38. Which of the following sequence is correct in cholesterol synthesis ?
A) Mevalonate → Isoprenoid units → Squalene → Lanosterol
B) Mevalonate → Squalene → Isoprenoid units → Lanosterol
C) Mevalonate → Isoprenoid units → Lanosterol → Squalene
D) Mevalonate → Lanosterol → Isoprenoid units → Squalene
39. Find out the mismatch between amino acid and its corresponding amine.
A) Cysteine-β-mercapto ethanol amine B) Glutamic acid-γ-amino butyric acid
C) Ornithine-cadaverine D) Histidine-Histamine
40. A one year old female patient is lethargic, weak and anemic. Her height and weight are both low for her age. Her urine contains an elevated level of orotic acid. The administration of which of the following compounds is most likely to alleviate her symptoms ?
A) Thymidine B) Uridine C) Guanine D) Adenine
41. Which immunoglobulin does play role in hypersensitivity reactions and defend the body from helminthic parasites ?
A) IgG B) IgA C) IgD D) IgE
42. The resolving power of TEM is derived from
A) Electrons B) Specimens
C) Power D) Ocular system

A

43. Which of the following metabolic disorder of phenyl alanine and tyrosine metabolic pathway does not match to its defective enzyme ?
- Phenyl ketonuria – Phenyl alanine hydroxylase
 - Tyrosinaemia Type I – Hydrolase
 - Tyrosinaemia Type II – Hydroxylase
 - Alkaptonuria – Homogentisate oxidase
44. A sedentary fifty-year-old man weighing 80 kg requests a physical examination. He denies any health problems. Routine blood analysis is unremarkable except for plasma cholesterol of 280 mg/dl. The man refuses drug therapy for his hypercholesterolemia. Analysis of a one-day dietary recall showed the following :
- | | | | |
|---------------|-----------|---------------|--------|
| Kilocalories | 3475 kcal | Cholesterol | 822 mg |
| Protein | 102 g | Saturated fat | 69 g |
| Carbohydrates | 383 g | Total fat | 165 g |
| Fiber-Crude | 6 g | | |
- Changes in which one of the following dietary components would have the greatest effect in lowering plasma cholesterol ?
- Cholesterol
 - Saturated fat
 - Polyunsaturated fat
 - Carbohydrate
45. Pulse field gel electrophoresis separates DNA molecule of size
- 10-20 bp
 - 20-30 kb
 - 30-50 kb
 - 40-50 bp
46. Amino sugars (Hexosamines) are not the constituents of which one of the following ?
- Hyaluronic acid
 - Chondroitin Sulphate
 - Erythromycin and carbomycin
 - Streptomycin
47. Diphtheria toxin inhibits translation by binding with
- eIF-2
 - 40 S subunit of ribosome
 - eEF-2
 - 60 S subunit of ribosome
48. An enzyme of purine metabolism associated with immunodeficiency disease
- Adenosine deaminase
 - Xanthine oxidase
 - PRPP synthetase
 - HGPRT
49. Ketone bodies are not utilized or oxidized in which one of the following tissues ?
- Heart
 - Brain
 - Liver
 - Muscles

57. Passive immunity is obtained by injecting
 A) Antibiotics B) Antigens C) Antibodies D) Vaccines
58. Mobilization of stored iron occurs in which of the following sequences ?
 A) Ferritin of RE system → Ferritin of intestinal mucosal cells → Absorption from Intestine
 B) Ferritin of intestinal mucosal cells → Absorption from intestine → Ferritin of RE system
 C) Ferritin of RE system → Absorption from intestine → Ferritin of intestinal mucosal cells
 D) Absorption from intestine → Ferritin of intestinal mucosal cells → Ferritin of RE system
59. Which one of the following statements about the urea cycle is correct ?
 A) The two nitrogen atoms that are incorporated into urea enter the cycle as ammonia and alanine
 B) Urea is produced directly by the hydrolysis of ornithine
 C) ATP is required for the reaction in which argininosuccinate is cleaved to form arginine
 D) Urinary urea is increased by a diet rich in protein
60. Shine-Delgarno sequence is present in which of the following RNA ?
 A) tRNA B) mRNA C) rRNA D) SnRNA
61. The suprasegmental feature juncture is related to
 A) Intonation B) Duration C) Stress D) Tone
62. Which of the following are examples of physiological biometric ?
 1. Retina
 2. Thermogram
 3. Keystroke dynamics
 A) 1 and 3 only B) 1, 2 and 3 C) 2 and 3 only D) 1 and 2 only
63. Which of the following are useful to determine location of a given mobile device ?
 1. Time Difference of Arrival
 2. Time of Arrival
 3. Enhanced Observed Time Difference
 A) 1, 2 and 3 B) 1 and 2 only C) 1 and 3 only D) 2 and 3 only

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64. **Statement – I** : One of the primary technologies used to detect deception with brain-based measures is Event-Related Potentials (ERPs).

Statement – II : ERPs are derived from the Electroencephalogram (EEG).

- A) Statement – I is true and Statement – II is false
- B) Statement – I is false and Statement – II is true
- C) Both Statement – I and Statement – II are false
- D) Both Statement – I and Statement – II are true

65. A three-barrelled long firearm with a combination of smooth and rifled barrels is better known as

- A) Vierling
- B) Drilling
- C) Machine gun
- D) Sub-machine gun

66. The most common calibre of tear-gas ammunition encountered is

- A) 6 mm
- B) 8 mm
- C) 9 mm
- D) 12 mm

67. Velocity of recoil of a gun weighing 3 kilograms firing a 100 gram bullet at 300 metre/second is

- A) 1 metre/second
- B) 3 metre/second
- C) 6 metre/second
- D) 9 metre/second

68. Which of the following ASTM standards are for separation of ignitable liquid residue from fire debris ?

- 1. ASTM E1386-00
 - 2. ASTM E1412-00
 - 3. ASTM E1413-00
 - 4. ASTM E2388-00
- A) 1, 2 and 4 only
 - B) 2, 3 and 4 only
 - C) 1, 2 and 3 only
 - D) 1, 3 and 4 only

69. The common shapes of crystalline pigments are

- 1. Spherical
 - 2. Cubic
 - 3. Rectangular
 - 4. Needle-shaped
- A) 1, 2 and 3 only
 - B) 1, 2 and 4 only
 - C) 1, 3 and 4 only
 - D) 2, 3 and 4 only

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77. According to Casper's dictum, time taken for the same amount of putrefaction to occur when body is in air, water and buried in earth is in the ratio of
A) 8 : 1 : 2 B) 1 : 2 : 8 C) 4 : 1 : 3 D) 3 : 1 : 4
78. Which of the following are characteristics observed in antemortem wounds ?
1. No hemorrhage
2. Cellular proliferation and infiltration
3. Absence of spurting
4. Staining of wound edges
Choose the correct option :
A) 1 and 2 only B) 2 and 3 only
C) 2 and 4 only D) 3 and 4 only
79. In Tsuchihashi classification, reticulate grooves belong to which of the following type of lip prints ?
A) Type I B) Type II
C) Type III D) Type IV
80. As per Gosta Gustafson's method, which of the following is the single most reliable criteria for determination of age from teeth in dead ?
A) Secondary dentin B) Cementum apposition
C) Root resorption D) Transparency of root
81. Running amok is a culture bound syndrome observed due to consumption of which of the following plant poisons ?
A) *Cannabis sativa* B) *Digitalis purpurea*
C) *Abrus precatorius* D) *Atropa belladonna*
82. **Statement – I** : Oral administration of heroin is 1.5 times more potent than that of morphine.
Statement – II : 6-monoacetyl morphine is more potent μ agonist than morphine.
In the light of the above two statements choose the correct option :
A) Both Statement – I and Statement – II are true
B) Both Statement – I and Statement – II are false
C) Statement – I is true, but Statement – II is false
D) Statement – I is false, but Statement – II is true

A

83. Match the following List – I with List – II :

List – I

- a. Organochlorines
- b. Pyrethroids
- c. Organophosphorus
- d. Carbamates

List – II

- i. Allethrin
- ii. Dimeton
- iii. Carbaryl
- iv. Dieldrin

Choose the correct option from those given below :

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

84. Hooch tragedy is a term associated with spurious consumption of which of the following ?

- A) Dhatura B) Opium C) Cocaine D) Illicit liquor

85. Which of the following bending vibrations are observed in IR spectroscopy, which causes two atoms move either above or below with respect to plane of central atom ?

- A) Rocking B) Twisting C) Scissoring D) Wagging

86. Arrange the following in correct sequence for Atomic Mass Spectrometric Analysis.

1. Separation of ion based on m/z ratio
2. Ionization
3. Measuring the ion current
4. Atomization

Choose the correct option :

- A) 4, 2, 1, 3 B) 2, 4, 1, 3
C) 2, 1, 3, 4 D) 1, 2, 3, 4

87. Which of the following is the characteristics of the ideal detector for Gas Chromatography ?

1. Good stability and reproducibility
2. Nonlinear response to solutes
3. Short response time
4. Poor reliability

Choose the correct option :

- A) 1, 2 and 3 only B) 2, 3 and 4 only
C) 1 and 3 only D) 2 and 4 only

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88. Which of the following is the correct sequence of F-number with respect to passage of light through the lens ?

- A) $F/2.0 > F/2.8 > F/4.0 > F/5.6$
- B) $F/2.8 > F/2.0 > F/4.0 > F/5.6$
- C) $F/4.0 > F/5.6 > F/2.8 > F/2.0$
- D) $F/5.6 > F/4.0 > F/2.8 > F/2.0$

89. Match the following List – I with List – II :

List – I

List – II

- | | |
|---------------------------------------|-----------------------------|
| a. Double diffusion in one dimension | i. Ouchterlony method |
| b. Single diffusion in two dimensions | ii. Mancini method |
| c. Double diffusion in two dimensions | iii. Oudin method |
| d. Single diffusion in one dimension | iv. Oakley-Fulthorpe method |

Choose the correct option from those given below :

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

90. Which of the following methods for determination of blood group in dried bloodstain is based on the detection of antibody ?

- | | |
|-------------------------------|---------------------------------|
| A) Absorption elution method | B) Lattes' crust method |
| C) Mixed agglutination method | D) Absorption inhibition method |

91. Reaction in Barberio's test for the chemical examination of seminal fluid detects the presence of which of the following ?

- | | |
|-------------|------------------|
| A) Spermine | B) Pyruvate |
| C) Choline | D) Ascorbic acid |

92. Which of the following polymorphic markers shows the least variation between individuals ?

- | | | | |
|-----------|---------|-----------|--------|
| A) D18S51 | B) TPOX | C) D21S11 | D) FGA |
|-----------|---------|-----------|--------|

93. "Squash" on the printed document is the characteristics of which of the following printing techniques ?

- | | |
|----------------|----------------|
| A) Gravure | B) Lithography |
| C) Letterpress | D) Laser |

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Space for Rough Work



A