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Question Booklet Alpha Code

A

A

Question Booklet Sl. No.

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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1. What is the actual weight of a body having mass 10 kg ?
A) 9.8 N B) – 9.8 N C) 98 N D) – 98 N
2. What is the velocity of Radio waves in free space ?
A) 3×10^8 m.s⁻¹ B) 6×10^8 m.s⁻¹ C) 1×10^8 m.s⁻¹ D) 2×10^8 m.s⁻¹
3. A half wave rectifier produces 80 watts output power when an a.c. power of 200 watts is applied as input. What is the rectification efficiency ?
A) 80% B) 40% C) 2.5% D) 25%
4. Which of the following electromagnetic radiation is used for producing crystal diffraction patterns ?
A) Visible light B) X-rays
C) Radio waves D) Infrared radiations
5. The self destruction of an unstabilised transistor by thermal run away is caused by
A) Emitter current B) Base current
C) Collector current D) All
6. Oscillator in an electronic circuit is used for
A) Energy conversion B) Energy production
C) Energy destruction D) No effect
7. Identify the reason for getting different colours in the case of oil spread over water.
A) Non-uniform thickness B) Non-uniform inclination
C) Non-uniform thickness and inclination D) None
8. Where do we find maximum cosmic ray intensity ?
A) Between poles and equator B) Equator
C) Geomagnetic poles D) Below sea level
9. Which is the main energy source of sun ?
A) Organic fuels B) Radiation from other galaxies
C) Fusion reaction D) Fission reaction

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10. Identify the weakest force.
- A) Weak nuclear force B) Strong nuclear force
C) Electromagnetic force D) Gravitational force
11. A particle is executing simple harmonic motion. What fraction of the total energy is kinetic, if the displacement is $1/2$ the amplitude ?
- A) $1/2$ B) 0 C) $1/8$ D) $3/4$
12. Which among the following is not the unit of time ?
- A) Parsec B) Millisecond
C) Lunar month D) Solar day
13. Which factor determines the difference between isothermal and adiabatic elasticity ?
- A) Ratio of velocities B) Ratio of densities
C) Ratio of specific heats D) Ratio of pressures
14. Most probable position of a particle in a box for $n = 1$ state is at
- A) $x = 0$ B) $x = L/4$ C) $x = L/2$ D) $x = 3/4 L$
15. How much energy is required to knock out an electron from the innermost orbit ?
- A) $13.6/2$ eV B) 13.6 eV C) 27.2 eV D) 0
16. Which observation led to the discovery of deuterium by Harold Urey in 1932 ?
- A) Difference in mass
B) Difference in wavelength
C) Difference in field effect
D) Difference in magnetic properties
17. Two charges ‘ $4e$ ’ and ‘ e ’ are separated by a distance ‘ a ’. Where a third charge ‘ q ’ should be placed to keep the equilibrium ?
- A) $a/3$ from e B) $a/2$ from e C) $a/4$ from e D) at e
18. Identify the quark having greatest rest mass.
- A) Strange B) Up C) Down D) Bottom

19. Which among the following is a Three-level Laser ?

A) He-Ne laser B) Semiconductor laser
C) Ruby laser D) Nd : YAG laser

20. Identify the multivibrator which generates square waves of its own.

A) Bistable B) Astable
C) Monostable D) ON stable

21. In an adiabatic expansion, let U_1 and U_2 be the internal energies of the initial and final state. Which is the correct expression ?

A) $U_1 > U_2$ B) $U_1 = U_2$
C) $U_1 < U_2$ D) None of the above

22. What is the change in entropy when 341.25 grams of ice at 0°C is converted into water at the same temperature ? Latent heat of ice = 80 cal/g.

A) 100 cal/g B) 0.01 cal/g
C) 27300 cal/g D) 4.266 cal/g

23. What is the average Fermi energy at 0 K ?

A) $\frac{3}{5} E_F$ B) $\frac{1}{2} E_F$
C) $\frac{5}{3} E_F$ D) $\frac{2}{3} E_F$

24. What is VANTA BLACK ?

A) Vertically aligned nanotube arrays
B) Vertical arrays of nanotube alignment
C) Vertically aligned nanotype arrays
D) Virtually aligned nanotube arrays

25. What happens to the Gibb's function in a first order phase change ?

A) Decreases B) Increases
C) Infinite D) Constant

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26. "It is impossible to transfer heat from a cold body to a hot body without doing external work." This is

 - A) Planck's statement
 - B) Kelvin statement
 - C) Carnot's statement
 - D) Clausius' statement

27. Biogas produced by the anaerobic decomposition of organic materials

 - A) Ethane
 - B) Methane
 - C) Carbon dioxide
 - D) Ammonia

28. An electrical device that converts the energy of light directly into electricity

 - A) Photo detector
 - B) Laser
 - C) Photovoltaic cell
 - D) Maser

29. What is the number of nuclei remaining after 'n' half life periods ?

 - A) $N_0/2^n$
 - B) $N_0/4^n$
 - C) $N_0/0.5^n$
 - D) $N_0/0.693^n$

30. Objects which are comprised of even number of Fermions comes under the category

 - A) Mesons
 - B) Bosons
 - C) Leptons
 - D) Baryons

31. What is the difference between a zone plate and a convex lens ?

 - A) Zone plate has one focal length
 - B) Convex lens has number of foci
 - C) Both have one focal length
 - D) Zone plate has number of foci

32. How is the emission of photoelectrons produced ?

 - A) Elastic collision between a photon and a phonon
 - B) Elastic collision between a phonon and an electron
 - C) Inelastic collision between a photon and an electron
 - D) Elastic collision between a photon and an electron

33. What is the momentum of the gamma ray photon having wavelength 10^{-10} m ?
- A) $h \times 10^{-10}$ B) $h \times 10^{10}$
 C) $hc \times 10^{10}$ D) $hc \times 10^{-10}$
34. The couple per unit twist for a hollow cylinder and a solid cylinder is C_1 and C_2 respectively. Choose the correct expression.
- A) $C_1 < \text{or } = C_2$ B) $C_1 < C_2$
 C) $C_1 = C_2$ D) $C_1 > C_2$
35. Which one contributes maximum to the density of universe ?
- A) Visible matter B) Solids and liquids
 C) Dark matter D) Gases and biomass
36. Large hadron collider is situated at
- A) ISRO B) CERN
 C) VSSC D) INFN
37. 'Little Boy' is the name of
- A) Little planet B) TNT
 C) Hydrogen bomb D) Atom bomb
38. What is the name given to lines drawn through different places having the same declination ?
- A) Isoclinic lines B) Isenthalpic lines
 C) Isogonic lines D) Isometric lines
39. What is the new resistance of a wire of resistance 'R' drawn 'n' times its original length ?
- A) $n^2 R$ B) $n R$ C) $n R/2$ D) $2 n R$
40. Who received Nobel Prize for the discovery of photoelectric effect ?
- A) Louis de Broglie B) Albert Einstein
 C) Niels Bohr D) Max Planck

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41. Which of the following molecules have larger bond angle ?

- A) NF_3 B) PF_3 C) AsF_3 D) SbF_3

42. Among the following iso-electronic ions which have larger ionic radius ?

- A) N^{3-} B) O^{2-} C) F^- D) Na^+

43. Among the following compounds :

- (i) $\text{CH}_3 - \text{COOH}$
(ii) $(\text{CH}_3)_2\text{CH} - \text{COOH}$
(iii) $(\text{CH}_3)_3\text{C} - \text{COOH}$
(iv) $\text{H} - \text{COOH}$

The acidity order is

- A) (i) > (ii) > (iv) > (iii) B) (iv) > (i) > (ii) > (iii)
C) (iv) > (ii) > (i) > (iii) D) (ii) > (i) > (iii) > (iv)

44. Match the following :

A

- (i) Lyman series
(ii) Paschen series
(iii) Balmer series
(iv) Pfund

B

- (i) Far Infra-red
(ii) Infra-red
(iii) Near Infra-red
(iv) Ultra-violet
(v) Visible

- A) (i) – (i), (ii) – (iii), (iii) – (iv), (iv) – (ii)
B) (i) – (iii), (ii) – (i), (iii) – (iv), (iv) – (ii)
C) (i) – (iv), (ii) – (ii), (iii) – (v), (iv) – (i)
D) (i) – (v), (ii) – (iv), (iii) – (iv), (iv) – (ii)

45. How many α and β particles are lost when ${}_{92}\text{U}^{238}$ is converted to ${}_{88}\text{Ra}^{226}$?

- A) 3 α -particles and 2 β -particles B) 2 α -particles and 3 β -particles
C) 1 α -particle and 3 β -particles D) 4 α -particles and 3 β -particles

46. Packing fraction is related to

 - A) Nuclear spin
 - B) Mass defect
 - C) Radioactivity
 - D) Atomic number

47. Which of the following is the correct order of bond dipole moment ?

 - A) C-Cl > C-Br > C-I
 - B) C-I > C-Br > C-Cl
 - C) C-Cl < C-I < C-Br
 - D) C-Br < C-I < C-Cl

48. Among the following molecule which has the longest C-H bond length ?

 - A) Ethene
 - B) Ethyne
 - C) Ethane
 - D) All have same C-H bond length

49. Trimethyl amine is a weaker base than dimethyl amine due to

 - A) Inductive effect
 - B) Electromeric effect
 - C) Resonance effect
 - D) Steric effect

50. Identify an electrophile.

 - A) SO_2
 - B) SO_3
 - C) NF_3
 - D) H_2O

51. Entropy is a measure of

 - A) Heat content
 - B) Free energy
 - C) Enthalpy
 - D) Randomness

52. Diels-Alder reaction is an example of which type of reaction ?

 - A) Electrophilic addition
 - B) Nucleophilic addition
 - C) Pericyclic reaction
 - D) Sigmatropic reaction

53. Compounds HCN and HNC are

 - A) Tautomers
 - B) Metamers
 - C) Functional isomers
 - D) Conformers

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54. Baeyer's reagent is

- A) Aqueous KMnO_4 solution
- B) 1% Alkaline KMnO_4 solution
- C) Acidic KMnO_4 solution
- D) Aqueous solution of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$

55. The compound which does not show Friedel-Craft's reaction is

- A) Chlorobenzene
- B) Toluene
- C) Nitrobenzene
- D) Phenol

56. Which of the following molecule can exhibit geometrical isomerism ?

- A) $\text{CH}_3 - \text{CH} = \text{CH}_2$
- B) $(\text{CH}_3)_2\text{C} = \text{CH}_2$
- C) $\text{CH}_3 - \text{CH} = \text{C}(\text{CH}_3)_2$
- D) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$

57. The reagent which may be used to distinguish between starch and cellulose is

- A) Tollen's reagent
- B) Iodine solution
- C) Acetic anhydride
- D) Fehling's solution

58. The polysaccharide on hydrolysis give only fructose is

- A) Cellulose
- B) Amylopectin
- C) Amylose
- D) Inulin

59. Glucose and Mannose may be obtained by Kiliani synthesis from

- A) D-arabinose
- B) D-xylose
- C) D-ribose
- D) D-lyxose

60. The oxides of nitrogen which is isoelectronic with CO_2 is

- A) NO
- B) N_2O_2
- C) NO_2
- D) N_2O

61. Gamma rays are
- A) Extremely small and fast moving particles of matter
 - B) High speed positrons
 - C) Electromagnetic radiations
 - D) High speed neutrons
62. Among the following which electromagnetic radiation has maximum wavelength ?
- A) Ultraviolet
 - B) Radio waves
 - C) X-rays
 - D) Infrared
63. The half-life period of a radioactive element is 140 days. After 560 days, one gram of the element will reduce to
- A) 1/2 g
 - B) 1/4 g
 - C) 1/8 g
 - D) 1/16 g
64. Splitting of spectral line when atoms are subjected to strong electric field is called
- A) Stark effect
 - B) Zeeman effect
 - C) Photoelectric effect
 - D) Decay
65. Which of the following has the largest atomic radius ?
- A) Li
 - B) K
 - C) Ra
 - D) Sr
66. Which among the following is the strongest acid ?
- A) HF
 - B) HCl
 - C) HBr
 - D) HI
67. Halogen which shows highest electropositive character is
- A) F
 - B) I
 - C) Cl
 - D) Br

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68. The gas used for inflating the tires of airplanes is

69. Plaster of Paris is

- A) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ B) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
C) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ D) $\text{CaSO}_4 \cdot 1\frac{1}{2} \text{H}_2\text{O}$

70. Which of the following compounds has the lowest anion to cation size ratio ?

71. The fingerprint region in the IR spectrum is

- A) $900 - 1400 \text{ cm}^{-1}$ B) $12500 - 400 \text{ cm}^{-1}$
C) $666 - 50 \text{ cm}^{-1}$ D) $666 - 4000 \text{ cm}^{-1}$

72. Which of the following is a chromophore ?

- A) NH_2 B) NO_2
C) Br D) OH

73. When λ_{max} of a compound shifts to a longer wavelength, the compound is said to have undergone

- A) Hypsochromic shift
 - B) Hyperchromic shift
 - C) Bathochromic shift
 - D) None of the above

74. Which of the following is thermosetting plastic ?

- A) Perspex
 - B) Bakelite
 - C) PVC
 - D) PVA

75. The acid used in the synthesis of nylon 66 is

A) Formic acid B) Stearic acid
C) Palmetic acid D) Adipic acid

76. Which among the following aldehyde undergoes Aldol condensation ?

A) HCHO B) $C_6H_5 - CHO$
C) CH_3CHO D) All the above

77. Which is the correct order of reactivity of alkyl halides in S_N2 reaction ?

A) RF > RCl > RBr > RI
B) RF > RBr > RCl > RI
C) RCl > RBr > RF > RI
D) RI > RBr > RCl > RF

78. Which of the following is an intensive property ?

A) Viscosity B) Mass
C) Volume D) Internal energy

79. The SI unit of Radioactivity is

A) Curie B) Rutherford
C) Becquerel D) Roengten

80. X-rays are used for the study of crystal structure because

A) X-rays are completely absorbed by the crystal
B) The wavelength of X-rays is of the same order of magnitude as the interatomic spacing in crystals
C) The wavelength of X-rays is very small in comparison with the interatomic spacing in crystals
D) The crystals are completely transparent to X-rays

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81. Which of the following is a computer code ?
A) UPS B) IEEE C) ASCII D) HTTP
82. What is FTP ?
A) File Translation Process B) File Transfer Process
C) Folder Transfer Protocol D) File Transfer Protocol
83. A computer can store data on all of the following devices except
A) Keyboard B) Floppy disk C) HDD D) CD-RW
84. Authentication of any electronic record by means of an electronic procedure is called
A) Two factor authentication B) Digital signature
C) Biometric authentication D) Cryptography
85. A markup language used for creating web pages and web applications
A) COBOL B) HTML C) PL/1 D) HTTP
86. Choose the output device.
A) Sensors B) Microphone C) Scanner D) Monitor
87. An attack that tricks people into providing sensitive information
A) Ransomware B) Adware C) Phishing D) DOS attack
88. A _____ is a network security system that uses rules to control incoming and outgoing network traffic.
A) Key logger B) Telnet C) Spyware D) Firewall
89. Section 66A of Information Technology Act, 2000 is concerned with
A) Preventing posting of harmful and offensive information
B) Preventing unauthorised access of computer resources
C) Controlling domain name service
D) Controlling internet service providers
90. Which of the following is a Cyber Crime ?
A) Testing B) Ethical hacking
C) Child grooming D) Debugging

Space for Rough Work

