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QUESTIONS & ANSWERS (2020)

PHYSICS

Questions : (1-66)

breaking stress does not depend upon shape or size of material

1. A coil of wire of radius R has 200 turns and a self-inductance of 108 mH. The self-inductance of a similar coil of 500 turns will be

- (a) 375 mH
- (b) 527 mH
- (c) 675 mH
- (d) None of these

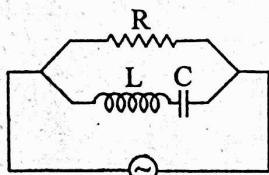
2. de-Broglie wavelength of atom at T k absolute temperature will be

- (a) $\frac{h}{mkT}$
- (b) $\frac{h}{\sqrt{3mkT}}$
- (c) $\frac{\sqrt{2mkT}}{h}$
- (d) $\sqrt{2mkT}$

3. Mark correct option

- (a) The root mean square speeds of the molecules of different ideal gases, maintained at the same temperature are the same.
- (b) Electrons in a conductor have no motion in the absence of a potential difference across it.
- (c) One mole of a monoatomic ideal gas is mixed with one mole of a diatomic ideal gas. The molar specific heat of the mixture at constant volume is 2R.
- (d) The pressure exerted by an enclosed ideal gas depends on the shape of the container.

4. The current in resistance R at resonance is



$V = V_0 \sin \omega t$

- (a) zero
- (b) minimum but finite
- (c) maximum but finite
- (d) infinite

5. A glass ball is dropped from height 10m. If there is 20% loss of energy due to impact, then after one impact, the ball will go upto

- (a) 2 m
- (b) 4 m
- (c) 6 m
- (d) 8 m

6. The breaking stress of wire of length l and radius r is 5 kgwtm^{-2} . The length and radius of wire are doubled, the breaking stress in kgwtm^{-2} is

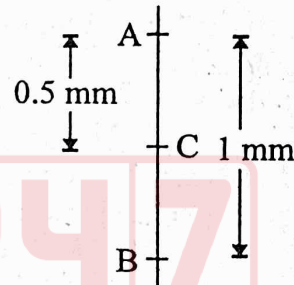
- (a) 5
- (b) 10
- (c) 20
- (d) 80

7. A block is released from top of a smooth inclined plane. It reaches the bottom of the plane in 6 sec. The time taken by the body to cover the first half of the inclined plane is

- (a) 3 sec
- (b) 4 sec
- (c) $3\sqrt{2}$ sec
- (d) 5 sec

8. In Young's double slits experiment, the length of band is 1 mm. The fringe width is 0.021 mm. The number of fringes is

- (a) 45
- (b) 46
- (c) 47
- (d) 48



9. Hailstone at 0°C falls from a height of 1 km on an insulating surface converting whole of its kinetic energy into heat. What part of it will melt? ($g = 10 \text{ m/s}^2$)

- (a) $\frac{1}{33}$
- (b) $\frac{1}{8}$
- (c) $\frac{1}{33} \times 10^{-4}$
- (d) All of it will melt

10. Deuterium atoms in the ground state are radiated by photons of energy 12.8 eV. What will be the energy of induced radiation of longest wavelength? Ionisation energy of deuterium is 14.4 eV.

- (a) 12.8 eV
- (b) 10.8 eV
- (c) 1.6 eV
- (d) 2.00 eV

$L \propto N^2$

$t = \frac{2s}{\sqrt{g \sin \theta}}$

resonance \rightarrow minimum \rightarrow maximum

$K_1 = \frac{20}{100} \times 10$

fric \uparrow
 $mgh = f m$
later heat

length of antenna = $\frac{\lambda}{4}$
 power of antenna $\propto \left(\frac{L}{\lambda}\right)^2$

A-2

OUAT ENTRANCE GUIDE

11. If both the length of an antenna and the wave length of the signal to be transmitted are doubled, the power radiated by the antenna
- (a) is doubled
 - (b) is halved
 - (c) increases 16 times
 - (d) remains constant
12. A particle of mass 100 g tied to a string is rotated along a circle of radius 0.5 m. The breaking tension of string is 10 N. The maximum speed with which particle can be rotated without breaking the string is
- (a) 10 m/s
 - (b) 9.8 m/s
 - (c) 7.7 m/s
 - (d) 7.07 m/s
13. A particular nucleus in a large population of identical radioactive nuclei survives 10 half lives of that isotope. The probability that this surviving nucleus will survive the next half-life is

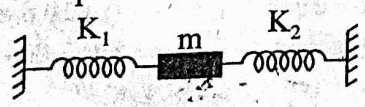
- (a) $\frac{1}{10}$
- (b) $\frac{2}{5}$
- (c) $\frac{1}{2}$
- (d) $\frac{1}{2^{10}}$

14. Which of the following quantities is NOT dimensionless?
- (a) Reynold's number
 - (b) Strain
 - (c) Angle
 - (d) Radius of gyration
15. A 50 mH coil carries a current of 2 amp, the energy stored in joule is
- (a) 1
 - (b) 0.05
 - (c) 0.1
 - (d) 0.5

16. A gas expands under constant pressure P from volume V_1 to V_2 , the work done by the gas is
- (a) $P(V_1 - V_2)$
 - (b) zero
 - (c) $P(V_1 + V_2)$
 - (d) $P\left(\frac{V_1 V_2}{V_2 - V_1}\right)$

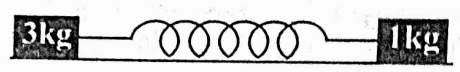
17. One 10V, 60W bulb is to be connected to 100V line. The required self-inductance of induction coil will be ($f = 50$ Hz)
- (a) 0.052 H
 - (b) 2.42 H
 - (c) 16.2 H
 - (d) 16.2 mH

18. As shown in figure, a body having mass m is attached with two springs having spring constants k_1 and k_2 . The frequency of oscillation is f. Now, if the springs constants of both the springs are increased 4 times, then the frequency of oscillation will be equal to



- (a) $2f$
- (b) $\frac{f}{2}$
- (c) $\frac{f}{4}$
- (d) $4f$

19. An isolated solid metallic sphere is given +Q charge. The charge will be distributed on the sphere
- (a) uniformly but only on surface
 - (b) only on surface but non-uniformly
 - (c) uniformly inside the volume
 - (d) non-uniformly inside the volume.
20. As shown in figure, two masses of 3.0 kg and 1.0 kg are attached at the two ends of a spring having force constant 300 Nm^{-1} . The natural frequency of oscillation for the system will be _____ hz. (Ignore friction)



- (a) $\frac{1}{4}$
- (b) $\frac{1}{3}$
- (c) 4
- (d) 3

21. At constant volume temperature is increased then
- (a) collision on walls will be less
 - (b) collision frequency will increase
 - (c) collision will be in straight line
 - (d) collision will not change

22. A battery of emf 1.2 V and internal resistance 0.5Ω is connected to resistance of 0.5Ω , the P.D. across the resistor is
- (a) 1.2 volt
 - (b) 1.1 volt
 - (c) 1.05 volt
 - (d) 1 volt

23. A gas is taken in a sealed container at 300 K. It is heated at constant volume to a temperature 600 K. The mean K.E. of its molecules is
- (a) halved
 - (b) doubled
 - (c) tripled
 - (d) quadrupled

24. A wire of diameter 1 mm breaks under a tension of 100 N. Another wire of same material as that of the first one, but of diameter 2 mm breaks under a tension of
- (a) 500 N
 - (b) 1000 N
 - (c) 10,000 N
 - (d) 4,000 N

25. If the total magnetic field due to the earth is 28 Am^{-1} then the total magnetic induction due to the earth is
- (a) $3.52 \times 10^{-7} \text{ T}$
 - (b) $3.52 \times 10^{-5} \text{ T}$
 - (c) $3.52 \times 10^{-2} \text{ T}$
 - (d) $3.52 \times 10^{-4} \text{ T}$

PREVIOUS YEAR QUESTIONS & ANSWERS

26. Minimum excitation potential of Bohr's first orbit in hydrogen atom is
 (a) 13.6 V (b) 3.4 V
 (c) 10.2 V (d) 3.6 V
27. Kinetic energy of emitted ray is dependent on
 (a) voltage only
 (b) work function only
 (c) Both (a) and (b)
 (d) It does not depend upon any physical quantity.

How many photons are emitted by a laser source of $5 \times 10^{-3} \text{ W}$ operating at 632.2 nm in 2 second? ($h = 6.63 \times 10^{-34} \text{ Js}$)

- (a) 3.2×10^{-16} (b) 1.6×10^{-16}
 (c) 4×10^{-16} (d) None of these

29. In a tangent galvanometer, a current of 0.1 A produces a deflection of 30° . The current required to produce a deflection of 60° is

- (a) 0.2 A (b) 0.3 A
 (c) 0.4 A (d) 0.5 A

30. When a rubber cord is stretched, the change in volume with respect to change in its linear dimension is negligible, the Poisson's ratio for rubber is

- (a) 1 (b) 0.25
 (c) 0.5 (d) 0.75

31. Choose the correct order of the root mean square velocity (v_{rms}), the average velocity (v_{av}) and the most probable velocity (v_{mp}).

- (a) $v_{\text{mp}} > v_{\text{av}} > v_{\text{rms}}$ (b) $v_{\text{rms}} > v_{\text{av}} > v_{\text{mp}}$
 (c) $v_{\text{av}} > v_{\text{mp}} > v_{\text{rms}}$ (d) $v_{\text{mp}} > v_{\text{rms}} > v_{\text{av}}$

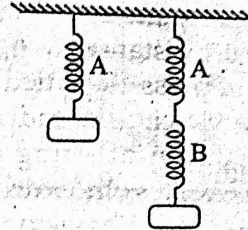
32. A conducting circular loop of radius r carries constant current i . It is placed in a uniform magnetic field B_0 such that B_0 is magnitude of magnetic field to a plane of the loop, the magnetic force acting on the loop is

- (a) irB_0 (b) $2\pi irB_0$
 (c) πirB_0 (d) zero

33. A block of mass 100 g slides on a rough horizontal surface. If the speed of the block decreases from 10 m/s to 5 m/s , the thermal energy developed in the process is

- (a) 3.75 J (b) 37.5 J
 (c) 0.375 J (d) 0.75 J

34. In the figure three identical springs are shown. From spring A, a mass of 4 kg is hung and spring shows elongation of 1 cm . But when a weight of 6 kg is hung on B, the Hook's descends



- (a) 1 cm (b) 2 cm
 (c) 3 cm (d) 4 cm

35. In order to obtain time constant of 10 sec in an R-C circuit containing a resistance of $10^3 \Omega$, the capacity of the condenser should be

- (a) $10 \mu\text{F}$ (b) $100 \mu\text{F}$
 (c) $1000 \mu\text{F}$ (d) $10000 \mu\text{F}$

36. Light of wavelength λ is incident on a slit of width d and distance between screen and slit is D . Then width of maxima and width of slit will be equal, if D is

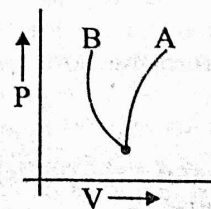
- (a) $\frac{d^2}{\lambda}$ (b) $\frac{2d}{\lambda}$
 (c) $\frac{2d^2}{\lambda}$ (d) $\frac{d^2}{2\lambda}$

37. A planet is moving in an elliptical orbit. If T , V , E and L are respectively the kinetic energy, potential energy, total energy and the magnitude of the angular momentum of the planet then the TRUE statement out of the following is

- (a) T is conserved
 (b) V is always positive
 (c) E is always negative

(d) L is conserved but the direction vector L continuously changes.

38. In the given graph, adiabatic and isothermal curves are shown



- (a) the curve A is isothermal
 (b) the curve B is isothermal
 (c) the curve A is adiabatic
 (d) Both (B) and (C) are correct

$k_{\text{eq}} = \frac{k_1 k_2}{k_1 + k_2}$

time const. = RC = $\frac{L}{R}$

$PV = K$

$PV^\gamma = K$

28

id + tan θ

$P \cdot r = \frac{I^2 r}{2} \cdot \frac{1}{2}$

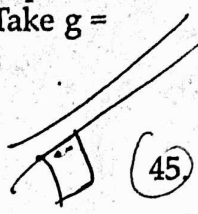
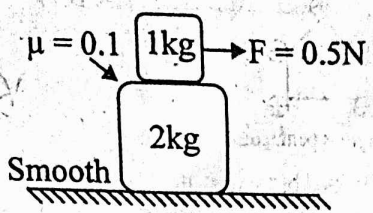
$F = I(L \times B)$

$v_2 = 1.414$
 $v_3 = 1.732$

A-4

QUAT ENTRANCE GUIDE

39. A force of 0.5 N is applied on upper block as shown in figure. The work done by lower block on upper block for a displacement 3 m of the upper block is (Take $g = 10 \text{ m/s}^2$)

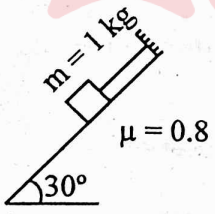


- (a) 1 joule (b) -1 joule
 (c) 2 joule (d) -2 joule

40. A particle of mass m is attached to one end of a string of length l while the other end is fixed to a point h above the horizontal table, the particle is made to revolve in a circle on the table, so as to make P revolutions per second. The maximum value of P if the particle is to be in contact with the table will be

- (a) $2P\sqrt{gh}$ (b) $2P\sqrt{\left(\frac{g}{h}\right)}$
 (c) $\sqrt{\left(\frac{g}{h}\right)}$ (d) $\frac{1}{2x}\sqrt{\left(\frac{g}{h}\right)}$

41. Figure shows a block of mass m kept on inclined plane with inclination θ . The tension in the string is



- (a) 8 N (b) 10 N
 (c) 0.8 N (d) zero

42. The gravitational potential difference between the surface of a planet and a point 20 m above it is 16 J/kg. Then the work done in moving a 2 kg mass by 8 m on a slope 60° from the horizontal, is

- (a) 11.1 J (b) 5.55 J
 (c) 16 J (d) 27.7 J

43. The alpha and beta particles cause ionisation because of

- (a) photoelectric emission
 (b) compton collision
 (c) pair production
 (d) the electrostatic force

44.

A train starts from station with an acceleration 1 m/s^2 . A boy who is 48 m behind the train with a constant velocity 10 m/s , the minimum time after which the boy will catch the train is

- (a) 4.8 sec (b) 8 sec
 (c) 10 sec (d) 12 sec

In an elastic string whose natural length is equal to that of a uniform rod be attached to the rod at both ends and suspended by the middle point

- (a) the rod will sink until the total work done is non-zero.
 (b) the rod will sink until the total work done is zero
 (c) sinking of rod is not determined or the basis of work done.
 (d) sinking of rod is not possible.

46.

The current gain of transistor is 100, if the base current changes by $10 \mu\text{A}$. What is the change in collector current?

- (a) 0.2 mA (b) 2 mA
 (c) 1 mA (d) 0.5 mA

47.

Which of the following physical quantities has Neither dimensions Nor unit?

- (a) Angle
 (b) Luminous intensity
 (c) Coefficient of friction
 (d) Current

48.

A weight W is suspended from the midpoint of a rope, whose ends are at the same level. In order to make the rope perfectly horizontal, the force applied to each of its ends must be

- (a) less than W (b) equal to W
 (c) equal to $2W$ (d) infinitely large

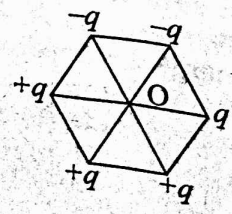
49.

Which of the following mode of propagation is used to send radio-waves from one place to another?

- (a) Space wave propagation
 (b) Sky wave propagation
 (c) Ground wave propagation
 (d) All of these

50.

Six point charges are arranged at the vertices of a regular hexagon of side length a (shown in figure). The magnitude of electric field at the centre of regular hexagon is



PREVIOUS YEAR QUESTIONS & ANSWERS

- (a) $\frac{q}{4\pi\epsilon_0 a^2}$ (b) zero
 (c) $\frac{q}{2\pi\epsilon_0 a^2}$ (d) None of these

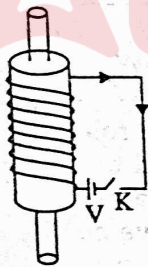
51. A particle is moving on a straight line path with constant acceleration directed along the direction of instantaneous velocity. Which of the following statements are FALSE about the motion of particle?

- (a) Particle may reverse the direction of motion.
 (b) Distance covered is not equal to magnitude of displacement.
 (c) The magnitude of average velocity is less than average speed.
 (d) All of these

52. In photoelectric effect, work function of material is 3.5 eV. By applying -1.2V potential, photoelectric current becomes zero, so

- (a) energy of incident photon is 4.7 eV
 (b) energy of incident photon is 2.3 eV
 (c) If photon having higher frequency is used, photoelectric current is produced.
 (d) When energy of photon is 2.3 eV, photoelectric current becomes maximum.

53. A conducting ring is placed around the core of an electromagnet as shown in figure. When key K is pressed, the ring

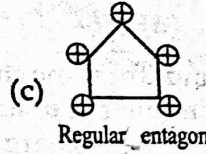
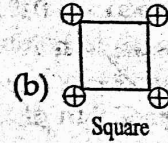
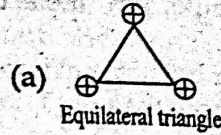


- (a) remains stationary
 (b) is attracted towards the electromagnet
 (c) jumps out the core
 (d) None of these

54. The height of the building is 50 ft. The same in millimetre is

- (a) 560 mm (b) 285 mm
 (c) 1786.8 mm (d) 15240 mm

55. In the following diagrams, all the charges have equal magnitude. Electric field is zero at the centre of



(d) All of these

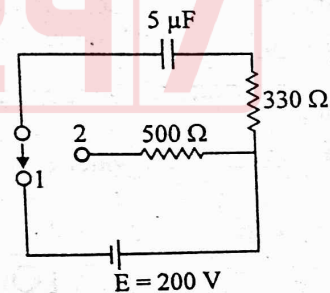
56. If 20 V battery is connected to primary coil of a transformer, then output voltage is

- (a) zero (b) 20 V
 (c) 10 V (d) None of these

57. A hollow sphere is filled with water. There is a hole at the bottom of this sphere. This sphere is suspended with a string from a rigid support and given an oscillation. During oscillation, the hole is opened up and the periodic time of this oscillating system is measured. The periodic time of the system

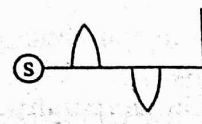
- (a) will remain constant
 (b) will increase upto a certain time
 (c) increases initially and then decreases to attain its initial periodic time
 (d) initially decreases and then will attain the initial periodic time value

58. The amount of heat generated in 500 Ω resistance, when the key is thrown over from contact 1 to 2, as shown in figure is



- (a) 40×10^{-3} J (b) 50×10^{-3} J
 (c) 60×10^{-3} J (d) 30×10^{-3} J

59. In the given figure, the convex lens is cut into two pieces and displace along the axes for small distance. The shape of fringe formed on the screen is

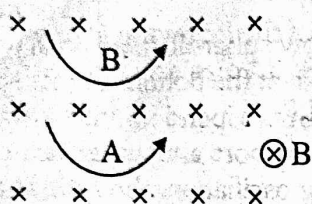


- (a) elliptical (b) hyperbolic
 (c) circular (d) None of these

60. Mean kinetic energy per gm. Molecule of a gas is given by

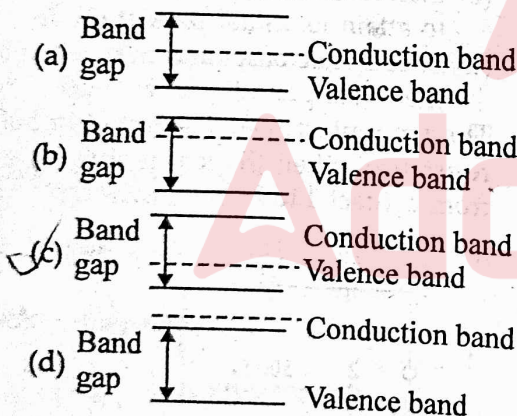
- (a) $\frac{3}{2} RT$ (b) kT
 (c) $\frac{1}{2} kT$ (d) $\frac{3}{2} kT$

61. Two point charges A and B of same charge having magnitude of momenta p_1 and p_2 respectively and having same charge are moving in a plane containing uniform magnetic field perpendicular to the plane. Then (Trajectories as shown in figure)



- (a) $p_1 = p_2$ (b) $p_1 > p_2$
 (c) $p_1 < p_2$ (d) None of these

62. Which one of the following diagrams correctly represents the energy levels in the p-type semiconductor?



63. A wire of cross-section 4 mm^2 is stretched by 0.1 mm by a certain weight. How far (length) will be wire of same material and length but of area 8 mm^2 stretched under the action of same force.

- (a) 0.05 mm (b) 0.10 mm
 (c) 0.15 mm (d) 0.20 mm

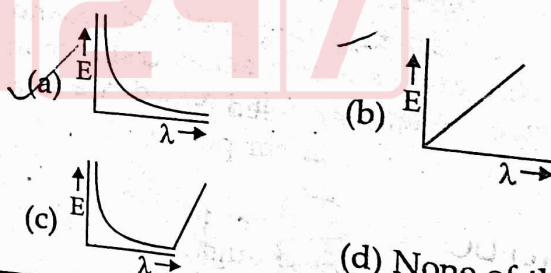
64. An iron rod is subjected to cycles of magnetisation at the rate of 50 Hz . Given the density of the rod is $8 \times 10^3 \text{ kg/m}^3$ and specific heat is $0.11 \times 10^{-3} \text{ cal/kg}^\circ\text{C}$. The rise in temperature per minute, if the area inclosed by the B-H loop corresponds to energy of 10^{-2} J , is [Assume there is no radiation losses]

- (a) 78°C (b) 88°C
 (c) 8.1°C (d) None of these

65. A carrier wave is modulated by n number of sine waves with modulation indices $\mu_1, \mu_2, \mu_3, \dots$. The total modulation index (μ) of the wave is

- (a) $\mu_1 + \mu_2 + \mu_3 + \dots$ (b) $\sqrt{\mu_1^2 + \mu_2^2 + \mu_3^2 + \dots}$
 (c) $\left[\frac{\mu_1^2 + \mu_2^2 + \mu_3^2 + \dots}{n} \right]^{1/2}$ (d) $\left[\frac{n}{\mu_1^2 + \mu_2^2 + \mu_3^2 + \dots} \right]^{1/2}$

66. Which one of the following is the correct graph between energy and wavelength for a given photon?



- (d) None of these

CHEMISTRY
Questions : (67-132)

67. Aspirin is a (n)

- (a) narcotic (b) antipyretic
 (c) tranquillizer (d) anaesthetic

68. Which of the following will NOT affect the value of equilibrium constant of a reaction?

- (a) Change in the concentration of the reactants
 (b) Change in temperature
 (c) Addition of catalyst
 (d) All of these

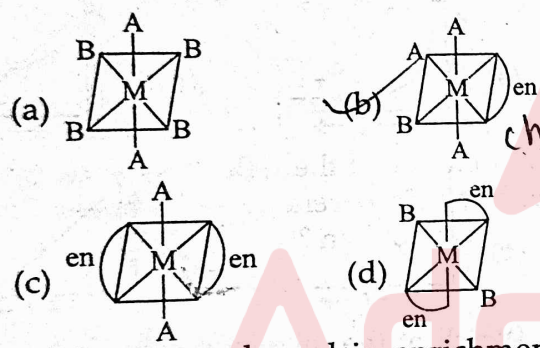
69. Glucose reacts with excess of phenylhydrazine and forms

- (a) sorbitol
 (b) glucose phenylhydrazone
 (c) Glucosazone
 (d) glucose oxime.

70. The entropy of a crystalline substance at absolute zero on the basis of third law of thermodynamics should be taken as

- (a) 100
 (b) zero
 (c) different for different substances
 (d) 50

71. Which of the following would undergo Hofmann's reaction to give a primary amine?
 (a) RCONH_2 (b) RCONHCH_3
 (c) RCOCl (d) RCOOR
72. Propene reacts with carbon monoxide and hydrogen in presence of cobalt carbonyl catalyst at high temperature and pressure, to form
 (a) propanal (b) butanal
 (c) butanone (d) butanoic acid
73. The hybrid state of central oxygen atom in diethylether is
 (a) sp^2 (b) sp^3
 (c) sp (d) sp^3d
74. The general molecular formula, which represents the homologous series of alkanol is;
 (a) $\text{C}_n\text{H}_{2n}\text{O}$ (b) $\text{C}_n\text{H}_{2n+1}\text{O}$
 (c) $\text{C}_n\text{H}_{2n+2}\text{O}$ (d) $\text{C}_n\text{H}_{2n}\text{O}_2$
75. The phenomenon of optical activity will be shown by



76. The compound used in enrichment of uranium for nuclear power plant is
 (a) U_3O_8 (b) UF_6
 (c) $\text{UO}_2(\text{NO}_3)_2$ (d) UCl_4
77. The sweetest of all sugars is
 (a) glucose (b) lactose
 (c) sucrose (d) fructose
78. In which case, the carbon-carbon bond length is same?
 (a) 2-butene (b) benzene
 (c) 1-butene (d) 1-propyne
79. Which is a correct relationship?
 (a) $\left[\frac{dH}{dT}\right]_P - \left[\frac{dE}{dT}\right]_T = (+ve)$
 (b) $\left[\frac{dE}{dV}\right]_T = 0$ (for ideal gas)
 (c) $\left[\frac{dV}{dT}\right]_P = \frac{nR}{P}$ (for ideal gas)
 (d) All of these

80. A crystal lattice with alternate +ve and -ve ions has radius ratio 0.524, its coordination number is
 (a) 4 (b) 3
 (c) 6 (d) 12
81. _____ bond is the most polar.
 (a) C-O (b) C-Br
 (c) C-S (d) C-F
82. Blood cells do NOT shrink in blood because blood is
 (a) hypertonic (b) isotonic
 (c) equimolar (d) hypotonic
83. Which of the following is known as Freon which is used as a refrigerant?
 (a) CCl_2F (b) CHCl_3
 (c) CH_2F_2 (d) CF_4
84. The credit for the discovery of transuranic elements goes to
 (a) Hahn (b) Rutherford
 (c) Seaborg (d) Curie
85. What is used to prevent electronic instruments clamaged by the moisture?
 (a) Silica gel (b) Zeolite
 (c) Chromatographic plate
 (d) All of these
86. dz^2 orbital has
 (a) a lobe along z-axis and a ring along xy-plane
 (b) a lobe along z-axis and a lobe along xy-plane
 (c) a lobe along z-axis and a ring along yz-plane
 (d) a lobe and ring along z-axis
87. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with
 (a) FeS (b) CO
 (c) Cu_2S (d) SO_2
88. Select the WRONG statement.
 (a) One curie = 3.7×10^{10} dis/minute
 (b) Actinium series start with U^{238}
 (c) Both (a) and (b)
 (d) None of these
89. Compound which is added to soap to impart antiseptic properties is
 (a) sodium laurylsulphate
 (b) sodium dodecylbenzenesulphonate
 (c) rosin (d) bithional

90. A compound is formed by elements A and B. This crystallizes in the cubic structure when atoms A are at the corners of the cube and atoms B are at the centre of the body. The simplest formula of the compound is

- (a) AB (b) AB₂
(c) A₂B (d) AB₄

91. In the following statements

- (a) Ideal gases are liquefied only at very low temperatures.
(b) Ideal gases cannot be liquefied.
(c) Ideal gas behaviour is observed by real gases at low pressures.
(d) Ideal gases do not exist.

the correct statements are

- (a) a, b, c and d (b) a, b and c
(c) b, c and d (d) c and d

92. Dacron is an example of

- (a) polyamide (b) polypropylene
(c) polyurethane (d) polyester

93. In the evaporation of water, the entropy

- (a) decreases (b) increases
(c) does not change (d) sometimes increases, sometimes decreases

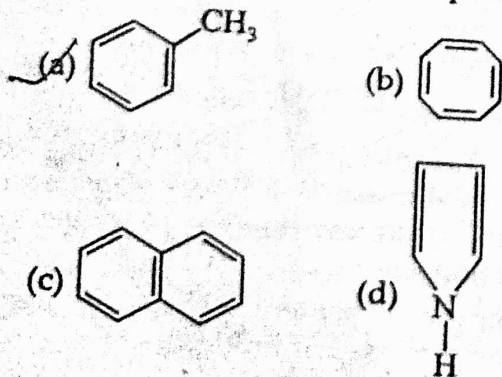
94. Dead burnt plaster is;

- (a) CaSO₄ (b) CaSO₄ · 1/2 H₂O
(c) CaSO₄ · H₂O (d) CaSO₄ · 2H₂O

95. Semipermeable membrane is that which permits the passage of;

- (a) solute molecules only
(b) solvent molecules only
(c) Both (a) and (b)
(d) Neither (a) nor (b)

96. Which is non-aromatic compound ?



97. When one coulomb of electricity is passed through an electrolytic solution, the mass deposited on the electrode is equal to

- (a) equivalent weight
(b) molecular weight
(c) electrochemical equivalent
(d) one gram

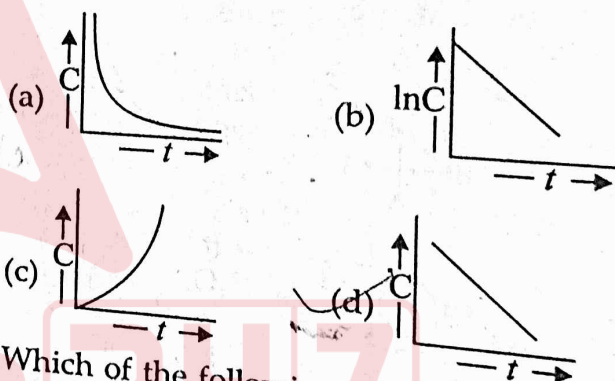
98. Among the following compounds, which one is NOT responsible for depletion of ozone layer ?

- (a) CH₄ (b) CFCl₃
(c) NO (d) Cl₂

99. In a chemical reaction, two reactants take part. The rate of reaction is directly proportional to the concentration of one of them and inversely proportional to the concentration of the other. The order of the reaction is

- (a) 0 (b) 1
(c) 2 (d) 4

100. The plot between concentration versus time for a zero order reaction is represented by



101. Which of the following could act as propellant for rockets ?

- (a) Liquid oxygen + Liquid argon
(b) Liquid nitrogen + Liquid oxygen
(c) Liquid hydrogen + Liquid oxygen
(d) Liquid hydrogen + Liquid nitrogen

102. Heating mixture of Cu₂O and Cu₂S will give

- (a) Cu + SO₂ (b) Cu + SO₃
(c) CuO + CuS (d) Cu₂SO₃

103. p-nitrophenol and o-nitrophenol are separated by

- (a) crystallisation (b) fractional distillation
(c) distillation (d) steam distillation

104. Which of the following has magnesium ?

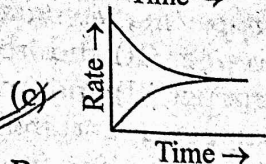
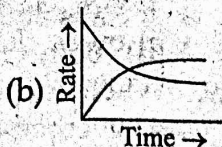
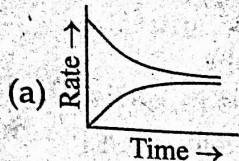
- (a) Carbonic anhydrase (b) Vitamin B₁₂
(c) Chlorophyll (d) Haemocyanine

105. Primary amine + aldehyde → X, what is X ?

- (a) Nitro (b) Nitroso
(c) Amino (d) Imino

PREVIOUS YEAR QUESTIONS & ANSWERS

106. Which graph will show equilibrium condition?



(d) None of these

107. Propyne on hydroboration-oxidation gives mainly

- (a) propanone (b) propanoic acid
(c) propanal (d) propane

108. The oxidation numbers of C in CH_4 , CH_3Cl , CH_2Cl_2 , CHCl_3 and CCl_4 are respectively.

- (a) +4, +2, 0, -2, -4 (b) +2, +4, 0, -4, -2
(c) -4, -2, 0, +2, +4 (d) -2, -4, 0, +4, +2

109. The reagent used for the preparation of higher ethers from halogenated ethers is

- (a) conc. H_2SO_4
(b) sodium alkoxide
(c) dry silveroxide
(d) Grignard reagent

110. Heavy water is used in atomic reactor as

- (a) coolant (b) moderator
(c) Both (a) and (b)
(d) Neither (a) nor (b)

111. CH_3OH and $\text{C}_2\text{H}_5\text{OH}$ may be distinguished chemically

- (a) by the action of HCl
(b) by the action of $\text{I}_2 + \text{Na}_2\text{CO}_3$
(c) by the action of NH_3
(d) solubility in water

112. Fluorosis, a bone disease, is caused by the presence of

- (a) pesticides in water
(b) fluorides in water
(c) carbon monoxide in air
(d) sulphur dioxide in air

113. Which one of the following cyano complexes would exhibit the lowest value of paramagnetic behaviour?

- (a) $[\text{Cr}(\text{CN})_6]^{3-}$ (b) $[\text{Co}(\text{CN})_6]^{3-}$
(c) $[\text{Fe}(\text{CN})_6]^{3-}$ (d) $[\text{Mn}(\text{CN})_6]^{3-}$

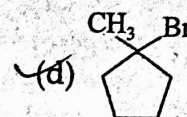
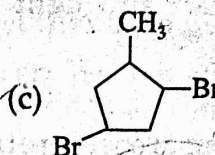
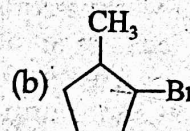
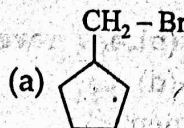
114. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally?

- (a) MgCO_3 (b) CaCO_3
(c) SrCO_3 (d) BaCO_3

115. Which of the following is NOT an actinide?

- (a) Curium (b) Californium
(c) Uranium (d) Terbium

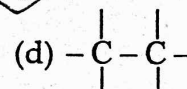
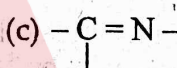
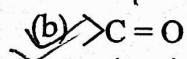
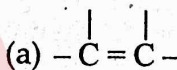
116. The major product formed by monobromination of methyl cyclopentane is



117. The half-life period of a first order reaction is 10 minutes. The time required for the concentration of the reactant to change from 0.08 M to 0.02 M is

- (a) 10 min. (b) 20 min.
(c) 30 min. (d) 40 min.

118. Which bond is the smallest?



high ϵ ve
so attract

119. The distance between two electrodes of a cell is 2.5 cm and area of each electrode is 5 cm^2 . The cell constant is

- (a) 2 (b) 12.5 $\frac{l}{a} =$
(c) 7.5 (d) 0.5

120. The conversion of PbO into $\text{Pb}(\text{NO}_3)_2$ involves

- (a) oxidation (b) reduction
(c) Neither (a) nor (b)
(d) Both (a) and (b)

121. A 0.6% urea solution would be isotonic with

- (a) 0.1 M glucose solution
(b) 0.1 M KCl solution
(c) 0.6% glucose solution
(d) 0.6% NaCl solution

122. The direct change from solid to gaseous state is referred to as

- (a) dissociation (b) decomposition
(c) sublimation (d) deliquescence

123. The maximum number of molecules is present in

- (a) 15 L of H_2 gas at STP
(b) 5 L of N_2 gas at STP
(c) 0.5 g of H_2 gas
(d) 10 g of O_2 gas

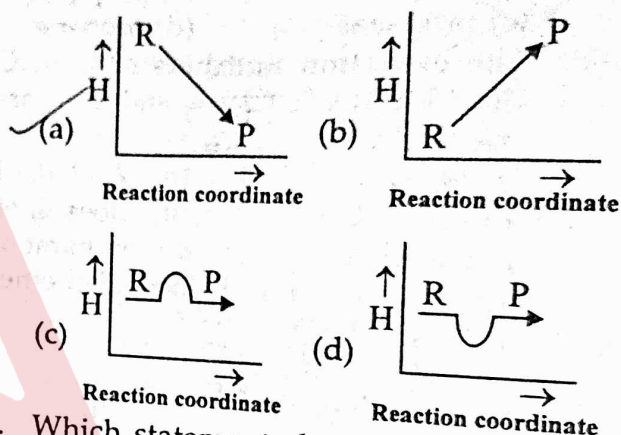
angular momentum = $\sqrt{L(L+1)} \frac{h}{2\pi}$

A-10

OUAT ENTRANCE GUIDE

124. Which of the following statements is (are) WRONG ?
- (a) If the value of $l = 0$, the electron distribution is spherical.
 - (b) The shape of the orbital is given by magnetic quantum no.
 - (c) Angular moment of 1s, 2s, 3s electrons are equal.
 - (d) In an atom, all electrons travel with the same velocity.
125. Chloroform
- (a) If exposed to air and light forms poisonous compound.
 - (b) if inhaled for long time effects central nervous system.
 - (c) is used to prepare chlorofluoromethane a freon refrigerant.
 - (d) All of these
126. Which of the followings is(are) NOT true ?
- (a) The most radioactive element present in pitchblende is uranium.
 - (b) ^{32}P is used for the treatment of leukaemia.
 - (c) CO_2 present in the air contains ^{12}C only.
 - (d) None of these
127. On which factors interface depends ?
- (a) Size of the molecules in the bulk phase
 - (b) Weight of the molecules in the bulk phase.
 - (c) Numbers of molecules in the bulk phase.
 - (d) Physical state of molecules in the bulk phase.
128. According to kinetic theory of gases
- (a) the pressure exerted by a gas is proportional to mean square velocity of the molecules.
 - (b) the pressure exerted by the gas is proportional to the root mean square velocity of the molecules.

- (c) the mean translation KE of the molecule is directly proportional to the absolute temperature.
- (d) Both (b) and (c)
129. When copper ore is mixed with silica, in a reverberatory furnace copper matte is produced. The copper matte contains.
- (a) sulphides of copper (II) and iron (II)
 - (b) sulphides of copper (II) and iron (III)
 - (c) sulphides of copper (I) and iron (II)
 - (d) sulphides of copper (I) and iron (III)
130. Which plot represents an exothermic reaction ?



131. Which statement about aspirin is NOT true ?
- (a) Aspirin belongs to narcotic analgesics.
 - (b) It is effective in relieving pain.
 - (c) It has antiblood clotting action.
 - (d) It is a neurologically active drug.
132. In a first order reaction $A \rightarrow B$, if k is rate constant and initial concentration of the reactant A is 0.5 M then half-life is
- (a) $\frac{\log 2}{k}$
 - (b) $\frac{\log 2}{k\sqrt{0.5}}$
 - (c) $\frac{\ln 2}{k}$
 - (d) $\frac{0.693}{0.5k}$

MATHEMATICS

Questions : (133-200)

133. Let $f: N \rightarrow N$ be defined by $f(x) = x^2 + x + 1$, then f is
- (a) one - one onto
 - (b) many one onto
 - (c) one-one but not onto
 - (d) None of these
134. $\lim_{x \rightarrow \infty} \frac{1}{n} \sum_{r=1}^{2n} \frac{r}{\sqrt{n^2 + r^2}}$ equals
- (a) $1 + \sqrt{5}$
 - (b) $-1 + \sqrt{5}$
 - (c) $-1 + \sqrt{2}$
 - (d) $1 + \sqrt{2}$
135. Let R be a relation on the set N be defined by $\{(x, y) | x, y \in N, 2x + y = 4\}$. Then R is
- (a) reflexive
 - (b) symmetric
 - (c) transitive
 - (d) None of these
136. If $f(x) = \frac{a \sin x + b \cos x}{c \sin x + d \cos x}$ decreases for all x , then
- (a) $ad - bc < 0$
 - (b) $ad - bc > 0$
 - (c) $ab - cd > 0$
 - (d) $ab - cd < 0$

137. Let $A = \{1, 2, 3\}$, $B = \{3, 4\}$, $C = \{4, 5, 6\}$. Then $A \cup (B \cap C)$ is
 (a) $\{3\}$ (b) $\{1, 2, 3, 4\}$
 (c) $\{1, 2, 5, 6\}$ (d) $\{1, 2, 3, 4, 5, 6\}$
138. If $f(x) = x^2 + \frac{x^2}{(1+x^2)} + \frac{x^2}{(1+x^2)^2} + \dots + \frac{x^2}{(1+x^2)^n} + \dots$, then at $x = 0$
 (a) $f(x)$ has no limit
 (b) $f(x)$ is discontinuous
 (c) $f(x)$ is continuous but not differentiable
 (d) $f(x)$ is differentiable
139. $\lim_{x \rightarrow 3} \frac{\sqrt{1 - \cos 2(x-3)}}{x-3} = ?$
 (a) $\sqrt{2}$ (b) Does not exist
 (c) 1 (d) $-\sqrt{2}$
140. An unbiased cubical die is thrown 5 times. The probability that the maximum number appearing on the die is 4 is
 (a) $\frac{7}{6^5}$ (b) $\frac{1023}{6^5}$
 (c) $\frac{3781}{6^5}$ (d) $\frac{1781}{6^5}$
141. The distance between the lines $5x - 12y + 65 = 0$ and $5x - 12y - 39 = 0$ is
 (a) 4 (b) 16
 (c) 2 (d) 8
142. The distance between the line $r = 2i - 2j + 3k + \lambda(i - j + 4k)$ and the plane $r \cdot (i + 5j + k) = 5$ is
 (a) $\frac{3}{10}$ (b) $\frac{10}{3}$
 (c) $\frac{10}{9}$ (d) $\frac{10}{3\sqrt{3}}$
143. If $\omega \neq 1$ is a cube root of unity and $\Delta = \begin{vmatrix} x + \omega^2 & \omega & 1 \\ \omega & \omega^2 & 1 + x \\ 1 & x + \omega^2 & \omega^2 \end{vmatrix}$, then value of x is
 (a) 0 (b) 1
 (c) -1 (d) None of these
144. If p and q are two propositions, then $\sim(p \leftrightarrow q)$ is
 (a) $\sim p \wedge \sim q$ (b) $\sim p \vee \sim q$
 (c) $(p \wedge \sim q) \vee (\sim p \wedge q)$ (d) None of these
145. Common roots of the equations $z^3 + 2z^2 + 2z + 1 = 0$ and $z^{1985} + z^{100} + 1 = 0$ are
 (a) w, w^2 (b) $1, w, w^2$
 (c) $-1, w, w^2$ (d) $-w, w^2$
146. Let $f(x) = \int_1^x \sqrt{2-t^2} dt$. Then the real roots of the equation $x^2 - f'(x) = 0$ are
 (a) ± 1 (b) $\pm \frac{1}{\sqrt{2}}$
 (c) $\pm \frac{1}{2}$ (d) 0 and 1
147. Which of the following functions from Z to itself are bijection?
 (a) $f(x) = x^3$ (b) $f(x) = x + 2$
 (c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + x$
148. Let $A = (p, q, r)$. Which of the following is NOT an equivalence relation on A ?
 (a) $R_1 = \{(p, q), (q, r), (p, r), (p, p)\}$
 (b) $R_2 = \{(r, q), (r, p), (r, r), (p, q)\}$
 (c) $R_3 = \{(p, p), (q, q), (r, r), (p, q)\}$
 (d) None of these
149. A particular solution of $\log \frac{dy}{dx} = 3x + 4y, y(0) = 0$ is
 (a) $e^{3x} + 3e^{-4y} = 4$ (b) $4e^{3x} - e^{-4y} = 3$
 (c) $3e^{3x} + 4e^{4y} = 7$ (d) $4e^{3x} + 3e^{-4y} = 7$
150. The area of the region bounded by the curves $y = x^2 + 2, y = x, x = 0$ and $x = 3$, in square units is
 (a) $\frac{21}{4}$ (b) $\frac{21}{2}$
 (c) $\frac{39}{2}$ (d) $\frac{39}{4}$
151. If sets A and B are defined as $A = \{(x, y) : y = e^x, x \in R\}$ and $B = \{(x, y) : y = x, x \in R\}$, then
 (a) $B \subset A$ (b) $A \subset B$
 (c) $A \cap B = \phi$ (d) $A \cup B = A$
152. If the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$ lies in the plane $x + 3y - \alpha z + \beta = 0$. Then $(\alpha, \beta) = ?$
 (a) (5, -15) (b) (-5, 5)
 (c) (6, -17) (d) (-6, 7)

153. If R is a relation from a set A to a set B and S is a relation from a set B to a set C, then the relation SoR
 (a) is from A to C (b) is from C to A
 (c) does not exist (d) None of these
154. The non-zero vectors a, b and c are related by $a = 8b$ and $c = -7b$. Then the angle between a and c is
 (a) 0 (b) $\frac{\pi}{4}$
 (c) $\frac{\pi}{2}$ (d) π
155. Let $f : A \rightarrow B$ and $g : B \rightarrow A$ be two functions such that $gof = I_A$. Then --
 (a) f is an injection and g is a surjection
 (b) f is a surjection and g is an injection
 (c) f and g both are injections
 (d) f and g both are surjections
156. The solution of the equation $(2x + y + 1)dx + (4x + 2y - 1)dy = 0$ is
 (a) $\log|2x + y - 1| = C + x + y$
 (b) $\log(4x + 2y - 1) = C + 2x + y$
 (c) $\log(2x + y + 1) + x + 2y = C$
 (d) $\log|2x + y - 1| + x + 2y = C$
157. If $z_1 = a + ib$ and $z_2 = c + id$ are complex numbers such that $|z_1| = |z_2| = 1$ and, then $\text{Re}(z_1 \bar{z}_2) = 0$, then the pair of complex numbers $w_1 = a + ic$ and $w_2 = b + id$ satisfy
 (a) $|w_1| = 1$ (b) $|w_2| = 1$
 (c) $\text{Re}(w_1 \bar{w}_2) = 0$ (d) All of these
158. The value of $\sum_{n=1}^{1000} \int_{n-1}^n e^{x-[x]} dx$ is ($[x]$ is the greatest integer function)
 (a) $\frac{e^{1000} - 1}{1000}$ (b) $\frac{e^{1000} - 1}{e - 1}$
 (c) $100(e - 1)$ (d) $\frac{e - 1}{1000}$
159. If the interior angles of a polygon are in A.P. with common difference 5° and smallest angle is 120° , then the number of sides of the polygon is
 (a) 9 or 16 (b) 9
 (c) 16 (d) 13
160. If $\left[\frac{x}{2}\right] + \left[\frac{x}{3}\right] = \frac{5x}{6}$, then x is any term of the following
 (a) 3, 6, 9, 12, ... (b) 9, 18, 27, 36, ...
 (c) 6, 12, 18, 24, ... (d) $\frac{6}{5}, \frac{12}{5}, \frac{18}{5}, \dots$
161. Let $f(x) = \text{sgn}(\text{sgn}(\text{sgn } x))$
 Then $\lim_{x \rightarrow 0} f(x)$ is
 (a) 1 (b) 2
 (c) 0 (d) None of these
162. If $\cos^{-1} x + \cos^{-1} \frac{y}{2} = \alpha$ then $4x^2 - 4xy \cos \alpha + y^2$ is equal to
 (a) $4 \sin^2 \alpha$ (b) $-4 \sin^2 \alpha$
 (c) $-2 \sin^2 \alpha$ (d) 4
163. The statement $\sim(p \leftrightarrow \sim q)$ is
 (a) equivalent to $\sim p \leftrightarrow q$
 (b) a tautology
 (c) a fallacy
 (d) equivalent to $p \leftrightarrow q$.
164. Suppose $a, b, c > 0$ and a, b, c are the pth, qth, rth terms of a GP. Let $\Delta = \begin{vmatrix} 1 & p & \log a \\ 1 & q & \log b \\ 1 & r & \log c \end{vmatrix}$
 Then numerical value of Δ is
 (a) -1 (b) 2
 (c) 0 (d) None of these
165. If letters of the word 'ASSASSIN' are written down at random in a row, the probability that no two S's occur together is
 (a) $\frac{1}{7}$ (b) $\frac{1}{14}$
 (c) $\frac{1}{28}$ (d) $\frac{1}{35}$
166. Let A, B, C be three square matrices of the same order, such that whenever $AB = AC$ then $B = C$, if A is
 (a) singular (b) non-singular
 (c) symmetric
 (d) skew-symmetric
167. If $\sum_{i=1}^{18} (x_i - 8) = 9$ and $\sum_{i=1}^{18} (x_i - 8)^2 = 45$ then the standard deviation of x_1, x_2, \dots, x_{18} is
 (a) $\frac{4}{9}$ (b) $\frac{9}{4}$
 (c) $\frac{3}{2}$ (d) None of these

PREVIOUS YEAR QUESTIONS & ANSWERS

168. The least number of times a fair coin must be tossed so that the probability of getting at least one head is 0.95, is
 (a) 5 (b) 6
 (c) 7 (d) 12
169. The equation of one side of a rectangle is $3x - 4y - 10 = 0$ and the coordinates of two of its vertices are $(-2, 1)$ and $(2, 4)$. Then the area of the rectangle is
 (a) 20 sq. units (b) 40 sq. units
 (c) 10 sq. units (d) 30 sq. units
170. The slope of the tangent to the curve
 $x = t^2 + 3t - 8$
 $y = 2t^2 - 2t - 5$
 at the point $(2, -1)$ is
 (a) $\frac{2}{3}$ (b) $\frac{6}{7}$
 (c) $\frac{4}{5}$ (d) $\frac{3}{2}$
171. The total number of proper divisors of 38808 is
 (a) 72 (b) 70
 (c) 69 (d) 71
172. The least value of n so that $y_n = y_{n+1}$ where $y = x^2 + e^x$ is
 (a) 4 (b) 3
 (c) 5 (d) 2
173. The interval in which x must lie so that the numerically greatest term in the expansion of $(1 - x)^{21}$ has the numerically greater coefficient is
 (a) $\left[\frac{5}{6}, \frac{6}{5}\right]$ (b) $\left(\frac{5}{6}, \frac{6}{5}\right)$
 (c) $\left(\frac{4}{5}, \frac{5}{4}\right)$ (d) $\left[\frac{4}{5}, \frac{5}{4}\right]$
174. $\int_0^3 |1 - x| dx$ equals
 (a) $\frac{1}{2}$ (b) $\frac{3}{2}$
 (c) $\frac{5}{2}$ (d) $\frac{7}{2}$
175. Logical equivalent proposition to the proposition $\sim(p \vee q)$ is
 (a) $\sim p \wedge \sim q$ (b) $\sim p \vee \sim q$
 (c) $\sim p \rightarrow \sim q$ (d) $\sim p \leftrightarrow \sim q$
176. The distance of the point $(1, -5, 9)$ from the plane $x - y + z = 5$ measured along a straight line $x = y = z$ is
 (a) $10\sqrt{3}$ (b) $5\sqrt{3}$
 (c) $3\sqrt{10}$ (d) $3\sqrt{5}$
177. The nearest point on the line $3x - y = 25$ from the origin is
 (a) $(-4, 5)$ (b) $(3, -4)$
 (c) $(3, 4)$ (d) $(3, 5)$
178. The unit vector which is orthogonal to the vector $5i + 2j + 6k$ and is coplanar with the vectors $2i + j + k$ and $i - j + k$ is
 (a) $\frac{1}{\sqrt{41}}(2i - 6j + k)$ (b) $\frac{1}{\sqrt{29}}(2i - 5j)$
 (c) $\frac{1}{\sqrt{10}}(3i - k)$ (d) $\frac{1}{\sqrt{69}}(2i - 8j + k)$
179. If A is a finite set having n elements, then $P(A)$ has \dots elements.
 (a) $2n$ (b) 2^n
 (c) n (d) None of these
180. A function out of the following whose period is NOT π is
 (a) $\sin^2 x$ (b) $\cos^2 x$
 (c) $\tan(2x + 3)$ (d) $y = |\sin x|$
181. $\lim_{x \rightarrow 0} \frac{a^x - 1}{\sqrt{a+x} - \sqrt{a}} = ?$
 (a) $2\sqrt{a} \log a$ (b) $\sqrt{a} \log a$
 (c) $\log a$ (d) None of these
182. If $0 \leq x \leq 1$ and $\theta = \sin^{-1} x + \cos^{-1} x - \tan^{-1} x$, then
 (a) $\theta \leq \frac{\pi}{2}$ (b) $\theta \geq \frac{\pi}{4}$
 (c) $\theta = \frac{\pi}{4}$ (d) $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$
183. Which of the following is NOT a statement?
 (a) 17 is a prime number
 (b) 22 is an odd number
 (c) What a beautiful flower!
 (d) New Delhi is Capital of India.
184. If $a = \omega \neq 1$ is a cube root of unity, $b = -785$, $c = 2008i$, and
 $\Delta = \begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix}$ then Δ equals
 (a) $-i$ (b) i
 (c) 1 (d) $1 - \omega i$
185. Four natural numbers are selected at random and are multiplied. The probability that the product is divisible by 5 or 10 is
 (a) $\frac{49}{625}$ (b) $\frac{369}{625}$
 (c) $\frac{64}{625}$ (d) $\frac{256}{625}$

186. Let $A = \begin{vmatrix} 3 & 2 \\ 1 & 1 \end{vmatrix}$, satisfies $A^2 + aA + bI = 0$, then a, b are respectively equal to

- (a) -4, 2 (b) -3, 3
(c) -4, 1 (d) -3, 1

187. The mean of 5 observations is 4.4 and the variance is 8.24. If three of the five observations are 1, 2 and 6, the two values are

- (a) 4 and 9 (b) 3 and 5
(c) 2 and 6 (d) 4 and 6

188. Three numbers are chosen at random without replacement from $\{1, 2, 3, \dots, 10\}$. The probability that minimum of the chosen number is 3 or their maximum is 7, is

- (a) $\frac{11}{30}$ (b) $\frac{11}{40}$
(c) $\frac{1}{7}$ (d) $\frac{1}{8}$

189. The equations of perpendicular bisectors of the sides AB and AC of a triangle ABC are $x - y + 5 = 0$ and $x + 2y = 0$, respectively. If the point A is $(1, -2)$, the equation of the line BC is

- (a) $23x + 14y - 40 = 0$
(b) $23x + 14y + 40 = 0$
(c) $14x + 23y - 40 = 0$
(d) $14x + 23y + 40 = 0$

190. If $y = \tan^{-1} \left(\frac{\log ex^{-2}}{\log ex^2} \right) + \tan^{-1} \left(\frac{3 + 2 \log x}{1 - 6 \log x} \right)$,

then $\frac{d^2y}{dx^2}$ is

- (a) 2 (b) 1
(c) 0 (d) x

191. Consider the proposition: "If we control population growth, we prosper". Negative of this proposition is

- (a) If we do not control population growth, we prosper.
(b) If we control population, we do not prosper.
(c) We control population but we do not prosper.
(d) We do not control population but we prosper.

192. If the tangent at $(1, 1)$ on $y^2 = x(2-x)^2$ meets the curve again at P, then P is

- (a) $(4, 4)$ (b) $(-1, 2)$
(c) $\left(\frac{9}{4}, \frac{3}{8}\right)$ (d) None of these

193. The value of the sum of the series $3^n C_0 - 8^n C_1 + 13^n C_2 - 18^n C_3 + \dots$ upon $(n+1)$ terms, is

- (a) 0 (b) 3^n
(c) $5n$ (d) None of these

194. The value of $\lim_{n \rightarrow \infty} \left[\frac{1}{\sqrt{4n^2-1}} + \frac{1}{\sqrt{4n^2-2^2}} + \dots + \frac{1}{\sqrt{4n^2-n^2}} \right]$ is

- (a) π (b) $\frac{\pi}{6}$
(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

195. If the letters of the word MOTHER are written in all possible orders and these words are written out as in a dictionary, then the rank of the word MOTHER is;

- (a) 240 (b) 261
(c) 308 (d) 309

196. An equation of the curve in which subnormal varies as the square of the ordinate is (k is constant of proportionality)

- (a) $y = Ae^{kx}$ (b) $y = e^{kx}$
(c) $\frac{y^2}{2} + kx = A$ (d) $y^2 + kx^2 = A$

197. The sum of the series

$(1+2) + (1+2+2^2) + (1+2+2^2+2^3) + \dots$ upto n terms is

- (a) $2^{n+2} - n - 4$ (b) $2(2^n - 1)$
(c) $2^{n+1} - n$ (d) $2^{n+1} - 1$

198. Let there be two points A, B on the curve $y = x^2$ in the plane OXY satisfying $OA \perp OB$ and $OB \perp i = -2$ then the length of the vector $2OA - 3OB$ is

- (a) $\sqrt{14}$ (b) $2\sqrt{51}$
(c) $3\sqrt{41}$ (d) None of these

199. If n is a positive integer greater than unity and z is a complex number satisfying the equation $z^n = (z+1)^n$, then

- (a) $\text{Im}(z) < 0$ (b) $\text{Im}(z) > 0$
(c) $\text{Im}(z) = 0$ (d) None of these

200. Let $[x]$ denotes the greatest integer less than or equal to x . If

$f(x) = \sin^{-1} x, g(x) = [x^2]$ and $h(x) = 2x, \frac{1}{2} \leq x \leq \frac{1}{\sqrt{2}}$, then

- (a) $f \circ g \circ h(x) = \frac{\pi}{2}$ (b) $f \circ g \circ h(x) = \pi$
(c) $h \circ f \circ g = \text{hogof}$ (d) $h \circ f \circ g \neq \text{hogof}$

BIOLOGY

Questions : (133 – 200)

133. *Homo sapiens* evolved during
 (a) Pleistocene (b) Oligocene
 (c) Pliocene (d) Miocene
134. In which one of the following do the two names refer to one and the same thing?
 (a) Tricarboxylic acid cycle and Urea cycle
 (b) Krebs cycle and Calvin cycle
 (c) Tricarboxylic acid cycle and Citric acid cycle
 (d) Citric acid cycle and Calvin cycle
135. Which of the following is a reducing sugar?
 (a) Galactose (b) Gluconic acid
 (c) β -methyl galactoside (d) Sucrose
136. In plant cells, peroxisomes are associated with
 (a) photorespiration (b) phototropism
 (c) photoperiodism (d) photosynthesis
137. Which of the following plant species you would select for the production of bioethanol?
 (a) Brassica (b) Zea mays
 (c) Pongamia (d) Jatropha
138. Afferent nerve fibres carry impulses from
 (a) effector organs to CNS
 (b) receptors to CNS
 (c) CNS to receptors
 (d) CNS to muscles
139. Bio augmentation is
 (a) the addition of commercially prepared bacterial strain.
 (b) production of fertilizers by using bacteria
 (c) the metals are deposited as insoluble oxides and sulphides by activities of bacteria
 (d) removal of pests
140. Glycogen is a polymer of
 (a) galactose (b) glucose
 (c) fructose (d) sucrose
141. If the mean and the median pertaining to a certain character of a population are of the same value, the following is most likely to occur.
 (a) Normal distribution
 (b) Bi-modal distribution
 (c) T-shaped curve
 (d) Skewed curve
142. Choose the correct match;
 Bladderwort, Sundew, Venusfly trap
 (a) *Nepenthes*, *Diorea*, *Drosera*
 (b) *Nepenthes*, *Utricularia*, *Vanda*
 (c) *Utricularia*, *Drosera*, *Diorea*
 (d) *Diorea*, *Trapa*, *Vanda*
143. One of the following is the correct sequence to make a Transgenic animals.
 (a) Transomics - Transfection - Micro infection - Electro portion - Retroviral vectors
 (b) Micro injection - Transfection - Electro portion - Retroviral vectors - Transomics
 (c) Transfection - Micro injection - Transomics - Electro portion - Retroviral vectors
 (d) None of these
144. Protein synthesis in an animal cell takes place.
 (a) only in the cytoplasm
 (b) in the nucleolus as well as in cytoplasm
 (c) in cytoplasm as well as in mitochondria
 (d) only on ribosomes attached to the nuclear envelope.
145. Flowering dependent on cold treatment is
 (a) cryotherapy (b) cryogenics
 (c) cryoscopy (d) vernalization
146. Transgenic plants are produced by using Ti Plasmids from the
 (a) *Agrobacterium tumefaciens*
 (b) *E. coli*
 (c) Bacteriophage
 (d) *Agrobacterium varians*
147. The plant group that produces spores and embryo but lacks vascular tissues and seeds is
 (a) Pteridophyta (b) Rhodophyta
 (c) Bryophyta (d) Phaeophyta
148. Removal of apical bud results in
 (a) formation of new apical bud
 (b) elongation of main stem
 (c) death of plant
 (d) formation of lateral branching

149. In pinus, the pollen grain has 6 chromosomes then its endosperm will have the chromosome
 (a) 12 (b) 18
 (c) 6 (d) 24
150. The foods made from genetically modified crops required to Pass human testing because
 (a) they may cause allergies
 (b) they may alter genes
 (c) they may cause mutations and release toxins
 (d) All of these
151. Aquatic reptiles are
 (a) amonotelic (b) ureotelic
 (c) ureotelic in water
 (d) ureotelic over land
152. Function of iris is to
 (a) move lens forward and backward
 (b) refract light rays
 (c) bring about movements of eye lids
 (d) alter the size of pupil
153. The aquatic fem, which is an excellent biofertilizer, is
 (a) Azolla (b) pteridium
 (c) Salvinia (d) Marselia
154. In a standard ECG, which one of the following alphabets is the correct representation of the respective activity of the human heart?
 (a) R-repolarisation of ventricles
 (b) S-start of systole
 (c) T-end of diastole
 (d) P-depolarisation of the atria
155. Total number of bones in the hind limb of man is
 (a) 14 (b) 30
 (c) 24 (d) 21
156. The worst environmental hazards were created by accidents in nuclear power plant and MIC gas tragedy respectively in
 (a) Russia in 1990 and Bhopal in 1986
 (b) Ukrain in 1988 and USA in 1984
 (c) Bhopal in 1984 and Russia in 1990
 (d) Ukrain in 1986 and Bhopal in 1984
157. Meiosis-II performs
 (a) separation of sex chromosomes
 (b) synthesis of DNA and centromeres
 (c) separation of homologous chromosomes
 (d) separation of chromatids
158. Sequence of which of the following is used to know the phylogeny?
 (a) mRNA (b) rRNA
 (c) tRNA (d) DNA
159. During which stage, in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP?
 (a) glycolysis (b) Krebs cycle
 (c) Conversion of pyruvic acid to acetyl Co-A
 (d) electron transport chain
160. Darwin's finches provide an excellent evidence in favour of evolution. This evidence comes from the field of
 (a) Biogeography (b) Anatomy
 (c) Embryology (d) Palaeontology
161. Movement of auxin is
 (a) Centripetal (b) Basipetal
 (c) Acropetal
 (d) Both (b) and (c)
162. A gene pair hides the effect of another. The phenomenon is
 (a) epistasis (b) dominance
 (c) mutation (d) None of these
163. Radioactive thymidine when added to the medium surrounding living mammalian cells gets incorporated into the newly synthesized DNA. Which of the following types of chromatin is expected to become radioactive if cells are exposed radioactive thymidine as soon as they enter the S-phase?
 (a) Heterochromatin (b) Euchromatin
 (c) Both (a) and (b)
 (d) Neither heterochromatin nor euchromatin but only the nucleolus
164. Which one of the following is the correct statement regarding the particular psychotropic drug specified?
 (a) Hashish causes alter thought perceptions and hallucinations.
 (b) Opium stimulates nervous system and causes hallucinations.
 (c) Morphine leads to delusions and distribed comolions.
 (d) Barbiturates cause relaxation and temporary Euphoria.
165. Flight muscles of bird are attached to
 (a) clavicle (b) keel of sternum
 (c) scapula (d) coracoid

PREVIOUS YEAR QUESTIONS

166. During cleavage, what is TRUE about cells?
 (a) Nucleocytoplasmic ratio remains unchanged
 (b) Size does not increase
 (c) There is less consumption of oxygen
 (d) The division is like meiosis
167. Pyrenoids are the centres for formation of
 (a) prophyra (b) enzymes
 (c) fat (d) starch
168. Modifications by germ line gene therapy are heritable as the Functional gene is incorporated into
 (a) their genome (b) one of the gene
 (c) somatic cells (d) All of these
169. In soil, water available for roots (to plants) is
 (a) capillary water (b) hygroscopic water
 (c) gravitational water
 (d) chemically bound water
170. Suppression of reproduction of one type of organism by utilizing some features of its biology or Physiology to destroy it or by use of another organism is known as
 (a) Competition (b) Predation
 (c) Biological control
 (d) Physiological control
171. Who discovered plasmodium in RBC of human beings?
 (a) Ronald Ross (b) Mendel
 (c) Laveran (d) Stephen
172. Which one of the following proved effective for biological control of nematodal diseases in plants?
 (a) *Pisolithus rinctorius*
 (b) *Pseudomonas cepacia*
 (c) *Glioclodium virens*
 (d) *Paecilomyces lilacinus*
173. Which one belongs to Monera?
 (a) Amoeba (b) *Escherichia*
 (c) Gelidium (d) *Spirogyra*
174. The Taj Mahal is threatened due to the effect of
 (a) Oxygen (b) Hydrogen
 (c) Chlorine (d) Sulphur dioxide
175. Study of fossils is
 (a) Palaeontology (b) Herpetology
 (c) Saurology (d) Organic evolution
176. A patient suffering from cholera is given saline drip because
 (a) Cl^- ions are important component of blood plasma
 (b) Na^+ ions help to retain water in the body
 (c) Na^+ ions are important in transport of substances across membrane
 (d) Cl^- ions help in the formation of HCl in stomach for digestion
177. Gonads develop from embryonic
 (a) ecdoderm (b) endoderm
 (c) mesoderm
 (d) Both (b) and (c)
178. Which of the following cranial nerves can regulate heart beat?
 (a) X (b) IX
 (c) VIII (d) VII
179. Random genetic drift in a population probably results from
 (a) constant low mutation rate
 (b) large population size
 (c) highly genetically variable individuals
 (d) interbreeding within this population
180. A deltoid ridge occurs in
 (a) radius (b) ulna
 (c) femur (d) humerus
181. The contrasting pairs of factors in Mendelian crosses are called
 (a) multiple alleles (b) allelomorphs
 (c) aliolori (d) paramorphs
182. Golgi apparatus is absent in
 (a) higher plants (b) yeast
 (c) bacteria and blue-green algae
 (d) None of these
183. In general, in the developmental history of a mammalian heart, it is observed that it passes through a two-chambered fish like heart, three-chambered frog like heart and finally to four-chambered stage. To which hypothesis can this above cited statement by approximated?
 (a) Hardy-Weinberg law
 (b) Lamarck's principle
 (c) Biogenetic law
 (d) Mendelian principles
184. Which is a part of pectoral girdle?
 (a) Glenoid cavity (b) Sternum
 (c) Ilium (d) Acetabulum

185. Due to discovery of which of the following in 1980 the evolution was termed as RNS world ?
 (a) mRNA, tRNA, rRNA synthesize proteins
 (b) In some virus RNA is genetic material
 (c) RNA have enzymatic property
 (d) RNA is not found in all cells.
186. Iris is part of
 (a) sclerotic
 (b) choroid / uvula
 (c) choroid and retina
 (d) sclerotic and choroid
187. Desert plants are generally
 (a) viviparous (b) succulent
 (c) herbaceous (d) heterophyllus
188. A condition of failure of kidney to form urine is called
 (a) deamination (b) entropy
 (c) anuria (d) None of these
189. In RNA, thymine is replaced by
 (a) adenine (b) guanine
 (c) Cytosine (d) Uracil
190. A transgenic food crop which may help in solving the problem of night blindness in developing countries is
 (a) Flavr savr tomatoes
 (b) Starling maize
 (c) Bt soybean
 (d) Golden rice
191. Escherichia coli is used extensively in biological research as it is
 (a) easily cultured (b) easily available
 (c) easy to handle
 (d) easily multiplied in host
192. Farmers have reported over 50% higher yields of rice by using which of the following biofertilizer ?
 (a) Mycorrhiza
 (b) Azolla pinnata
 (c) Cyanobacteria
 (d) Legume-Rhizobium symbiosis
193. The part of life cycle of malarial parasite plasmodium vivax, that is passed in female Anopheles is
 (a) Sexual cycle
 (b) Pre-erythrocytic schizogony
 (c) Exo-erythrocytic schizogony
 (d) Post-erythrocytic schizogony
194. The bacteria associated with plant genetic engineering are
 (a) Salmonella and Pseudomonas
 (b) Salmonella typhimurium and Agrobacterium
 (c) Bacillus thuringiensis and Pseudomonas fluorescens
 (d) Both (b) and (c)
195. In plants inulin and pectin are
 (a) reserved food material
 (b) wastes
 (c) secretory material
 (d) insect attacking material
196. Middle piece of mammalian sperm possesses
 (a) mitochondria and centriole
 (b) mitochondria only
 (c) centriole only
 (d) nucleus and mitochondria
197. Photoreceptors of earthworm occur on
 (a) clitellum (b) many eyes
 (c) dorsal surface (d) lateral sides
198. Most diverse macromolecules, found in the cell both physically and chemically are
 (a) proteins (b) carbohydrates
 (c) nucleic acids (d) lipids
199. The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show ?
 (a) S-shaped or sigmoid growth of this insect
 (b) The food plants mature and die at the end of the rainy season.
 (c) Its population growth curve is of J-type
 (d) The population of its predators increases enormously
200. Which is employed for artificial ripening of banana fruits ?
 (a) Auxin (b) Cumarin
 (c) Ethylene (d) Cytokinin

ANSWERS**PHYSICS**

1. (C) 2. (B) 3. (C) 4. (C) 5. (D) 6. (A) 7. (C) 8. (C) 9. (A) 10. (D)
 11. (D) 12. (D) 13. (C) 14. (D) 15. (C) 16. (A) 17. (A) 18. (A) 19. (A) 20. (D)
 21. (B) 22. (C) 23. (B) 24. (D) 25. (B) 26. (C) 27. (C) 28. (D) 29. (B) 30. (C)
 31. (B) 32. (D) 33. (A) 34. (C) 35. (D) 36. (D) 37. (C) 38. (D) 39. (A) 40. (D)
 41. (D) 42. (A) 43. (D) 44. (B) 45. (B) 46. (C) 47. (C) 48. (D) 49. (D) 50. (C)
 51. (D) 52. (B) 53. (C) 54. (D) 55. (D) 56. (A) 57. (C) 58. (C) 59. (C) 60. (A)
 61. (C) 62. (C) 63. (A) 64. (C) 65. (B) 66. (A)

CHEMISTRY

67. (B) 68. (A) 69. (C) 70. (C) 71. (A) 72. (B) 73. (B) 74. (C) 75. (B) 76. (B)
 77. (D) 78. (B) 79. (D) 80. (C) 81. (D) 82. (B) 83. (C) 84. (C) 85. (A) 86. (A)
 87. (C) 88. (C) 89. (D) 90. (A) 91. (C) 92. (D) 93. (B) 94. (A) 95. (B) 96. (A)
 97. (C) 98. (A) 99. (A) 100. (D) 101. (C) 102. (A) 103. (D) 104. (C) 105. (D) 106. (C)
 107. (C) 108. (C) 109. (D) 110. (C) 111. (B) 112. (B) 113. (B) 114. (D) 115. (D) 116. (D)
 117. (B) 118. (B) 119. (D) 120. (B) 121. (A) 122. (C) 123. (A) 124. (B) 125. (D) 126. (A)
 127. (A) 128. (C) 129. (C) 130. (A) 131. (A) 132. (C)

MATHEMATICS

133. (C) 134. (B) 135. (D) 136. (A) 137. (B) 138. (D) 139. (B) 140. (B) 141. (D) 142. (D)
 143. (A) 144. (C) 145. (A) 146. (A) 147. (B) 148. (D) 149. (D) 150. (B) 151. (C) 152. (D)
 153. (A) 154. (D) 155. (A) 156. (D) 157. (D) 158. (C) 159. (B) 160. (C) 161. (D) 162. (A)
 163. (D) 164. (C) 165. (B) 166. (B) 167. (C) 168. (A) 169. (A) 170. (B) 171. (B) 172. (B)
 173. (B) 174. (C) 175. (A) 176. (A) 177. (B) 178. (C) 179. (D) 180. (C) 181. (D) 182. (D)
 183. (C) 184. (C) 185. (B) 186. (C) 187. (A) 188. (B) 189. (C) 190. (C) 191. (C) 192. (C)
 193. (A) 194. (B) 195. (D) 196. (A) 197. (A) 198. (D) 199. (C) 200. (C)

BIOLOGY

133. (A) 134. (C) 135. (A) 136. (A) 137. (D) 138. (B) 139. (A) 140. (B) 141. (A) 142. (C)
 143. (B) 144. (C) 145. (D) 146. (A) 147. (C) 148. (D) 149. (C) 150. (D) 151. (B) 152. (D)
 153. (A) 154. (D) 155. (B) 156. (D) 157. (D) 158. (B) 159. (D) 160. (A) 161. (D) 162. (A)
 163. (B) 164. (A) 165. (B) 166. (B) 167. (D) 168. (A) 169. (A) 170. (C) 171. (C) 172. (B)
 173. (B) 174. (D) 175. (A) 176. (B) 177. (C) 178. (A) 179. (D) 180. (D) 181. (B) 182. (C)
 183. (C) 184. (A) 185. (C) 186. (D) 187. (B) 188. (C) 189. (D) 190. (D) 191. (A) 192. (B)
 193. (A) 194. (D) 195. (A) 196. (B) 197. (C) 198. (A) 199. (C) 200. (C)