

MHT-CET: ENTHUSE COURSE**Test Type : ONLINE TEST – 02****Test Pattern : MHT-CET****TEST DATE : 18-09-2020****PCM GROUP Paper code: CET2012FSPCB918****Roll No-**

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FULL SYLLABUS:***Important Instructions*****Do not open this Test Booklet until you are asked to do so.**

1. Immediately fill in the form number on this page of the Test Booklet with *Blue/Black Ball Point Pen*. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space)on the Test Booklet/Answer Sheet.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of **150** questions. The maximum marks are **200**. Duration 180 minutes

5. Question Paper Format :

Phy (50 Questions) chemistry (50 Questions) carring 1 mark each questions and Maths (50 Questions) carring 2 mark each.

Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Marking scheme: Phy chem. +1 for correct answer and 0 if not Attempted. No negative marking.

Mathematics +2 for correct answer and 0 if not Attempted. No negative marking.

6. Use **Blue/Black Ball Point Pen only** for writting particulars/marking responses on **Side-1** and **Side-2** of the Answer Sheet. **Use of pencil is strictly prohibited.**
7. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
8. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
9. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
10. **Do not fold or make any stray marks on the Answer Sheet.**

Your Hard Work Leads to Strong Foundation

SECTION – A- PHYSICS

1. A hemispherical vessel of radius R is rotating about its axis of symmetry, which is kept vertical. A small ball kept in the vessel, rotates with the vessel, without slipping on its inner smooth surface.

If the radius through the ball, makes an angle θ with the vertical, what is the angular speed of rotation of the vessel?

a) $\sqrt{\frac{g}{R \cos \theta}}$ b) $\sqrt{\frac{R \cos \theta}{g}}$ c) $\sqrt{\frac{g \sin \theta}{R}}$ d) $\sqrt{\frac{R \sin \theta}{g}}$

2. Suppose the gravitational force varies inversely as the n^{th} power of the distance. Then the period of a planet in circular orbit of radius R around the sun will be proportional to:

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

3. A solid cylinder rolls down a smooth inclined plane of height 3 m and reaches the bottom of the inclined plane with angular velocity of $2\sqrt{2}$ rad/s. What must be the radius of cylinder? (take $g = 10 \text{ m/s}^2$)

a) $\sqrt{5}m$ b) $\sqrt{10} \text{ cm}$ c) 10 cm d) 0.5 cm

4. The force constants of two springs are K_1 and K_2 , both are stretched till their elastic energies are equal. If the stretching forces are F_1 and F_2 , then $F_1 : F_2$ is

a) $\sqrt{\frac{K_1}{K_2}}$ b) $K_2 : K_1$ c) $K_1^2 : K_2^2$ d) $K_1 : K_2$

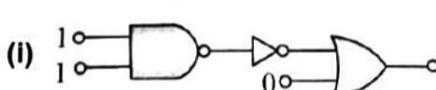
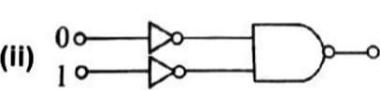
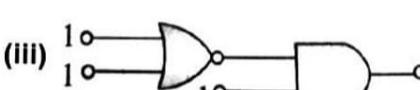
5. The bulk modulus of rubber is $9 \times 10^8 \text{ N/m}^2$. To what depth a rubber ball be taken in a lake so that its volume is decreased by 0.1 %?

a) 550 m b) 350 m c) 273 m d) 183 m

6. When a ray of light is incident on the surface of a glass slab at 60° , it is found that the reflected ray is completely plane polarised. What is the velocity of light in glass ?

a) $\sqrt{3} \times 10^8 \text{ m/s}$ b) $2 \times 10^8 \text{ m/s}$ c) $3 \times 10^8 \text{ m/s}$ d) $\sqrt{2} \times 10^8 \text{ m/s}$

7. In a biprism experiment, the distance between the two virtual sources is 0.1 mm and the screen is placed at 100 cm from the slits. If the wavelength of light used is 5000 \AA , then the distance of the 4th bright band from the central bright band will be
 a) 2 cm b) 1.5 cm c) 1 cm d) 3 cm
8. A $100 \mu\text{F}$ capacitor is to have an energy content of 50 J to operate a flash bulb. The voltage required to charge the capacitor is
 a) 1000 V b) 2000 V c) 500 V d) 250 V
9. A 5V battery with internal resistance 2Ω and a 2 V battery with internal resistance 1Ω are connected to a 10Ω resistor as shown in the figure. The current in the 10Ω resistor is
-
- a) 0.03 A from P_1 to P_2 b) 0.03 A from P_2 to P_1
 c) 0.27 A from P_1 to P_2 d) 0.27 A from P_2 to P_1
10. A long solenoid has 200 turns per cm and carries a current i . The magnetic field at its centre is $6.28 \times 10^{-2} \text{ Weber/m}^2$. Another long solenoid has 100 turns per cm and it carries a current $i/3$. What is the value of the magnetic field at its centre?
 a) $1.05 \times 10^{-3} \text{ Wb/m}^2$ b) $1.05 \times 10^{-4} \text{ Wb/m}^2$ c) $1.05 \times 10^{-2} \text{ Wb/m}^2$ d) $1.05 \times 10^{-5} \text{ Wb/m}^2$
11. The excess pressure inside the first soap bubble is three times that inside the second bubble. Then the ratio of the volume of the first and second bubbles is
 a) 1:3 b) 3:1 c) 1:27 d) 27:1
12. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of 15 ms^{-1} . Then, the frequency of sound that the observer hears in the echo reflected from the cliff is (Take velocity of sound in air = 330 ms^{-1})
 a) 838 Hz b) 885 Hz c) 765 Hz d) 800 Hz
13. A pipe open at both ends has a fundamental frequency f in air. The pipe is dipped vertically in water so that half of it is in water. The fundamental frequency of the air column is now
 a) $\frac{3f}{4}$ b) $2f$ c) f d) $\frac{f}{2}$

- 14.** For a gas $\frac{R}{C_V} = 0.4$, where 'R' is the universal gas constant and 'C_v' is molar specific heat at constant volume. The gas is made up of molecules which are
- a) Rigid diatomic b) Monoatomic c) Non-rigid diatomic d) Polyatomic
- 15.** An iron rod is placed parallel to magnetic field of intensity 2000 A/m. The magnetic flux through the rod is 6×10^{-4} Wb and its cross – sectional area is 3 cm². The magnetic permeability of the in Wb/A-m is
- a) 10^{-1} b) 10^{-2} c) 10^{-3} d) 10^4
- 16.** A current of $\frac{25}{\pi}$ Hz frequency is passing through an A.C. circuit having series combination of $R = 100 \Omega$ and $L = 2$ H, the phase difference between voltage and current is -----.
- a) 90° b) 60° c) 30° d) 45°
- 17.** A photon of energy E ejects a photoelectron from a metal surface whose work function is W_0 . If this electron enters into a uniform magnetic field of induction B in a direction perpendicular to the field and describes a circular path of radius r, then the radius r, is given by, (in the usual notation)
- a) $\sqrt{2e(E-W_0)mB}$ b) $\sqrt{2m(E-W_0)eB}$ c) $\sqrt{\frac{2e(E-W_0)}{mB}}$ d) $\frac{\sqrt{2m(E-W_0)}}{eB}$
- 18.** An electron of mass 'm' has de-Broglie wavelength ' λ ' when accelerated through potential difference 'V'. When proton of mass 'M', is accelerated through potential difference '9V', the de-Broglie wavelength associated with it will be (Assume that wavelength is determined at low voltage)
- a) $\frac{\lambda}{3}\sqrt{\frac{M}{m}}$ b) $\frac{\lambda}{3} \cdot \frac{M}{m}$
 c) $\frac{\lambda}{3}\sqrt{\frac{m}{M}}$ d) $\frac{\lambda}{3} \cdot \frac{m}{M}$
- 19.** In the following combinations of logic gates, the outputs of i, ii and iii are respectively
- (I) 
- (II) 
- (III) 
- a) 0,1,1 b) 0,1,0 c) 1,1,0 d) 1,0,1

- 20.** A modem is a
- a) Modulating device only.
 - b) Demodulating device only.
 - c) Modulating and demodulating device.
 - d) Transmitting device.
- 21.** A uniform circular disc of radius 50 cm at rest is free to turn about an axis which is perpendicular to its plane and passes through its centre. It is subjected to a torque which produces a constant angular acceleration of 2.0 rad s^{-2} . Its net acceleration in ms^{-2} at the end of 2.0 s is approximately
- a) 6.0
 - b) 3.0
 - c) 8.0
 - d) 7.0
- 22.** If the density of the earth is doubled keeping its radius constant, then acceleration due to gravity will be ($g = 9.8 \text{ m/s}^2$)
- a) 19.6 m/s^2
 - b) 9.8 m/s^2
 - c) 4.9 m/s^2
 - d) 2.45 m/s^2
- 23.** A hollow sphere of mass 'M' and radius 'R' is rotating with angular frequency ' ω '. It suddenly stops rotating and 75% of kinetic energy is converted to heat. If 'S' is the specific heat of the material in J/kg K then rise in temperature of the sphere is ($\text{M.I. of hollow sphere} = \frac{2}{3} MR^2$)
- a) $\frac{R\omega}{4S}$
 - b) $\frac{R^2\omega^2}{4S}$
 - c) $\frac{R\omega}{2S}$
 - d) $\frac{R^2\omega^2}{2S}$
- 24.** A particle perform simple harmonic motion with amplitude A. Its speed is tripled at the instant that it is at a distance $\frac{2A}{3}$ from equilibrium position. The new amplitude of the motion is
- a) 3A
 - b) $A\sqrt{3}$
 - c) $\frac{7A}{3}$
 - d) $\frac{A}{3}\sqrt{41}$
- 25.** A metal rod of length 'L', cross -sectional area 'A', Young's modulus 'Y' and coefficient of linear expansion ' α ' is heated to ' t ' ${}^{\circ}\text{C}$. The work that can be performed by the rod when heated is
- a) $\frac{YA\alpha Lt^2}{2}$
 - b) $\frac{YA\alpha^2 Lt^2}{2}$
 - c) $\frac{YA\alpha^2 L^2 t^2}{2}$
 - d) $\frac{YA\alpha Lt}{2}$
- 26.** A frame made of metallic wire enclosing a surface area A is covered with a soap film. If the area of the frame of metallic wire is reduced by 50% the energy of the soap film will be changed by
- a) 100%
 - b) 75%
 - c) 50%
 - d) 25%
- 27.** The phase difference between two points separated by 0.8 m in a wave of frequency 120 Hz is 90° . The wave velocity is
- a) 144 m/s
 - b) 256 m/s
 - c) 384 m/s
 - d) 720 m/s

28. In Melde's experiment in parallel position when mass m_1 is kept in the pan, then the number of loops obtained is p_1 and when mass m_2 is kept the number of loops is p_2 , then the mass of pan m_0 is

$$\text{a) } m_0 = \frac{P_1^2 - P_2^2}{m_2 P_2^2 - m_1 P_1^2} \quad \text{b) } m_0 = \frac{m_2 p_2^2 - m_1 p_1^2}{p_1^2 - p_2^2} \quad \text{c) } m_0 = \frac{m_2 p_2^2 + m_1 p_1^2}{p_1^2 - p_2^2} \quad \text{d) } m_0 = \frac{m_2 p_2^2 - m_1 p_1^2}{p_1^2 + p_2^2}$$

29. A monoatomic gas at a pressure P , having a volume V expands isothermally to a volume $2V$.

and then adiabatically to a volume $16V$. The final pressure of the gas is (take $\gamma = \frac{5}{3}$)

- a) 64 P b) 32 P c) $\frac{P}{64}$ d) 16 P

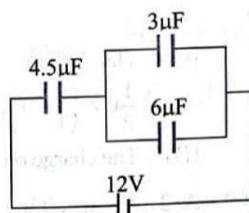
30. A light is travelling from air into a medium Velocity of light in a medium is reduced to 0.75 times the velocity in air. Assume that angle of incidence 'i' is very small, the deviation of the ray is

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

31. A slit of width a is illuminated by white light. For red light ($\lambda = 6500\text{\AA}$), the first minima is obtained at $\theta = 30^\circ$. Then the value of a will be

- a) 3250\AA b) $6.5 \times 10^{-4}\text{ mm}$ c) 1.24 micron d) $2.6 \times 10^{-4}\text{ cm}$

32. In the circuit shown in the figure, the potential difference across the $4.5\text{ }\mu\text{F}$ capacitor is



- a) $\frac{8}{3}\text{ volts}$ b) 4 volts c) 6 volts d) 8 volts

33. In a metrebridge the balancing length from the left end (standard resistance of one ohm is in the right gap) is found to be 20 cm. The value of the unknown resistance is

- a) 0.8Ω b) 0.5Ω c) 0.4Ω d) 0.25Ω

34. A galvanometer of resistance 30Ω is connected to a battery of emf $2V$ with 1970Ω resistance in series. A full scale deflection of 20 divisions is obtained in the galvanometer. To reduce the deflection to 10 divisions, the resistance in series required is

- a) 4030Ω b) 4000Ω c) 3970Ω d) 2000Ω

35. The magnetic moment of atomic neon is

- a) zero b) $2\mu B$ c) μB d) $\frac{3\mu B}{2}$

36. The average power dissipated in a pure inductor is

- a) $\frac{VI^2}{4}$ b) $\frac{1}{2}VI$ c) zero d) VI^2

37. The threshold frequency for certain metal is 3.3×10^{14} Hz. If light of frequency 8.2×10^{14} Hz is incident on the metal, the cut-off voltage of the photoelectric current will be

- a) 4.9 V b) 3.0 V c) 2.0V d) 1.0 V

38. Find the de-Broglie wavelength of an electron with kinetic energy 120 eV.

- a) 112 pm b) 95 pm c) 124 pm d) 102 pm

39. An LED is constructed from a pn junction based on a certain semi-conducting material whose energy gap is 1.9 eV. Then the wavelength of the emitted light is

- a) 6.5×10^{-7} m b) 2.9×10^{-9} m
c) 9.1×10^{-5} m d) 1.6×10^{-8} m

40. The process of superimposing signal frequency (i.e. audio wave) on the carrier wave is known as

- a) transmission b) reception c) modulation d) detection

41. The error in the measurement of length (L) of the simple pendulum is 0.1% and the error in

time period (T) is 3%. The maximum possible error in the measurement of $\frac{L}{T^2}$ is

- a) 2.9 % b) 3.1 % c) 5.9 % d) 6.1%

42. Let the angle between two non-zero vectors \vec{A} and \vec{B} be 120° and its resultant be \vec{C} , then

- a) \vec{C} must be equal to $|A - B|$ b) \vec{C} must be less than $|A - B|$
c) \vec{C} must be greater than $|A - B|$ d) \vec{C} must be zero

43. A machine gun fires a bullet of mass 40 gram with velocity 1200 m/s. The man holding it can exert a maximum force of 144N on the gun. How many bullets can be fire per second at the most?

- a) Only one b) 3 c) Any number of bullets d) 144×48

44. The reading of a manometer fitted to a closed tap is 3.5×10^5 N/m². If the valve is opened, the reading of the manometer falls to 3×10^5 N/m². The velocity of water is

- a) 1 m/s b) 10 m/s
c) 100 m/s d) 0.1 m/s

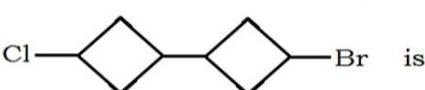
45. If the critical angle for the material of a prism is C and the angle of the prism is A, then there will be no emergent ray when
- a) $A < 2C$ b) $A = 2C$ c) $A > 2C$ d) $A < \frac{C}{2}$
46. For a plano-convex lens, the radius of curvature of convex surface is 10 cm and the focal length is 30 cm. The refractive index of the material of the lens is
- a) 1.5 b) 1.66 c) 1.33 d) 2.5
47. The magnitude of magnetic induction at a point due to small element is given by ____.
- a) Biot-Savart's law b) Oersted's law c) Ampere's law d) Faraday's law
48. A short bar magnet placed with its axis at 30° with a uniform external magnetic field of 0.25 T experiences a torque of 4.5×10^{-2} N-m. Magnetic moment of the magnet is
- a) 0.36 JT^{-1} b) 0.72 JT^{-1} c) 0.18 JT^{-1} d) Zero
49. A machine gun has a mass 5 kg. It fires 50 gram bullets at the rate of 30 bullets per minute at a speed of 400 ms^{-1} . What force is required to keep the gun in position?
- a) 10 N b) 5 N c) 15 N d) 30 N
50. A block of mass 0.1 kg is pressed against a wall with a horizontal force of 5 N. If the coefficient of friction between the wall and the block is 0.5, then the frictional force acting on the block will be
- a) 9.8 N b) 4.9 N c) 0.98 N d) 0.49 N

SECTION – B- CHEMISTRY

51. A gas is found to have the formula $(\text{CO})_x$. Its vapour density is 70. The value of x must be
- a) 7 b) 4 c) 5 d) 6
52. 1 amu is equal to
- a) $\frac{1}{12}$ of C-12 b) $\frac{1}{14}$ of O-16
 c) 1 g of H_2 d) 1.66×10^{-23} kg
53. Oxidation state of Ni in $\text{Ni}(\text{CO})_4$ is
- a) 0 b) +1 c) +2 d) +3
54. Which of the following has highest coagulating power for As_2S_3 sol?
- a) SO_4^{2-} b) Al^{3+} c) PO_4^{3-} d) K^+
55. sp^3d^2 hybridisation of the atomic orbitals gives
- a) Square planar structure b) Triangular structure
 c) Tetrahedral structure d) Octahedral structure

56. Fluorine molecule is formed by
- The axial p - p overlap
 - The sidewise p - p overlap
 - The axial s - p overlap
 - the overlap of two sp^2 hybrid orbitals
57. H_2O_2 is always stored in black bottles because
- It is highly unstable
 - Its enthalpy of decomposition is high
 - It undergoes auto oxidation on prolonged standing
 - None of these
58. The least stable free radical is
- $CH_3\dot{C}H_2$
 - $(CH_3)_2\dot{C}H$
 - $(CH_3)_3\dot{C}$
 - $\dot{C}H_3$
59. Which nomenclature is not according to IUPAC system?
- $Br - CH_2 - CH = CH_2$
1-Bromoprop-2-ene
 - $CH_3 - CH_2 - \overset{CH_3}{C} - CH_2 - \overset{CH_3}{C} - CH_3$
Br
4-Bromo-2,4-dimethylhexane
 - $CH_3 - \overset{CH_3}{C} - CH - \overset{CH_2CH_3}{C} - CH_2CH_3$
2-Methyl-3-phenylpentane
 - $CH_3 - \overset{\parallel}{C} - CH_2 - CH_2 - CH_2COOH$
O
5-Oxohexanoic acid
60. The reaction given below is an example of which of the following?
- $$2CH_3Br + 2Na \xrightarrow{\text{dry ether}} C_2H_6 + 2NaBr$$
- Reimer Tiemann reaction
 - Wurtz reaction
 - Hoffmann bromamide reaction
 - Aldol condensation
61. Pyrex glass is produced by fusing
- Al_2O_3 (60-80%), B_2O_3 (10-25%), SiO_2
 - SiO_2 (60-80%), B_2O_3 (10-25%), Al_2O_3
 - B_2O_3 (60-80%), SiO_2 (10-25%), Al_2O_3
 - SiO_2 (50%), Al_2O_3 (50%)
62. The formula for determination of density of unit cell is
- $\frac{a^3 \times N_A}{Z \times M} g \text{ cm}^{-3}$
 - $\frac{Z \times M}{a^3 \times N_A} g \text{ cm}^{-3}$
 - $\frac{a^3 \times M}{Z \times N_A} g \text{ cm}^{-3}$
 - $\frac{M \times N_A}{a^3 \times Z} g \text{ cm}^{-3}$
63. The unit of freezing point depression constant is
- $K \text{ mol}^{-1}$
 - $K \text{ kg}^{-1} \text{ mol}^{-1}$
 - $K \text{ kg mol}^{-1}$
 - $K \text{ kg}^{-1}$
64. If 0.15 g of a solute dissolved in 15 g of solvent is boiled at a temperature higher by 0.216°C than that of the pure solvent, the molecular weight of the substance (molal elevation of boiling point constant for the solvent is 2.16°C) is
- 1.01 g mol^{-1}
 - 10 g mol^{-1}
 - 1000 g mol^{-1}
 - 100 g mol^{-1}

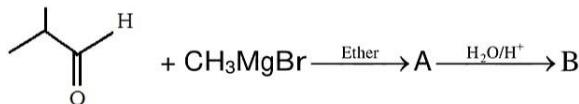
65. If α is the degree of dissociation of Na_2SO_4 the van't Hoff factor (i) used for calculating molecular mass is
- a) $1 + \alpha$ b) $1 - \alpha$ c) $1 + 2\alpha$ d) $1 - 2\alpha$
66. If ΔH is change in enthalpy and ΔU is the change in internal energy accompanying a gaseous reaction, then
- a) ΔH is always greater than ΔU
 b) ΔH is always lesser than ΔU
 c) $\Delta H < \Delta U$ only if the number of moles of the products is greater than the number of moles of the reactants
 d) $\Delta H < \Delta U$ only if the number of moles of the products is lesser than the number of moles of the reactants
67. The favourable conditions for a spontaneous reaction are
- a) $T \Delta S > \Delta H$, $\Delta H = +\text{ve}$, $\Delta S = +\text{ve}$ b) $T \Delta S > \Delta H$, $\Delta H = +\text{ve}$, $\Delta S = -\text{ve}$
 c) $T \Delta S = \Delta H$, $\Delta H = -\text{ve}$, $\Delta S = -\text{ve}$ d) $T \Delta S = \Delta H$, $\Delta H = -\text{ve}$, $\Delta S = +\text{ve}$
68. The moles of an ideal gas is expanded isothermally from $2.5 \times 10^{-3} \text{ m}^3$ to $8 \times 10^{-3} \text{ m}^3$ against a constant external pressure of $5 \times 10^5 \text{ N m}^{-2}$. The work done in the process is
- a) -2.525 kJ b) -2.750 kJ
 c) -0.2525 J d) -2.525 J
69. One coulomb is equal to
- a) 96500 Faraday b) charge on 6.24×10^{18} electrons
 c) charge on 1 electron d) none of the above
70. How long would it take to deposit 100 g of aluminium from an electrolytic cell containing Al_2O_3 using a current of 125 A? [Given : At. Mass of Al = 27]
- a) 95.30 min b) 143 min
 c) 47.65 min d) 10 min
71. The position of some metals in the electrochemical series in decreasing electropositive character is given as $\text{Mg} > \text{Al} > \text{Zn} > \text{Cu} > \text{Ag}$. What will happen if a Al spoon is used to stir a solution of zinc nitrate ?
- a) The spoon will get coated with aluminium b) Aluminium sulphate will be formed
 c) The solution will contain aluminium nitrate d) There will be no reaction
72. For the reaction, $2X + 3Y \rightarrow 4Z$, the rate of reaction may be represented as
- a) $\text{rate} = -\frac{1}{2} \frac{d[X]}{dt} = -\frac{1}{3} \frac{d[Y]}{dt} = -\frac{1}{4} \frac{d[Z]}{dt}$ b) $\text{rate} = -\frac{1}{2} \frac{d[X]}{dt} = -\frac{1}{3} \frac{d[Y]}{dt} = \frac{1}{4} \frac{d[Z]}{dt}$
 c) $\text{rate} = \frac{1}{2} \frac{d[X]}{dt} = \frac{1}{3} \frac{d[Y]}{dt} = \frac{1}{4} \frac{d[Z]}{dt}$ d) $\text{rate} = \frac{1}{2} \frac{d[X]}{dt} = -\frac{1}{3} \frac{d[Y]}{dt} = -\frac{1}{4} \frac{d[Z]}{dt}$
73. If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately
- a) 50 minutes b) 45 minutes c) 60 minutes d) 40 minutes
74. The correct expression for activation energy is,
- a) $\log_{10} \frac{k_1}{k_2} = \frac{E_a(T_1 - T_2)}{2.303R \times T_1 \times T_2}$ b) $\log_{10} \frac{k_2}{k_1} = \frac{E_a(T_1 - T_2)}{2.303 R \times T_1 \times T_2}$
 c) $\log_{10} \frac{k_2}{k_1} = \frac{E_a(T_2 - T_1)}{2.303R \times T_1 \times T_2}$ d) $\log_{10} \frac{k_2}{k_1} = \frac{E_a(T_2 - T_1)}{R \times T_1 \times T_2}$

75. Which method is not correctly given for refining of crude metals?
- a) Distillation : zinc and mercury
 - b) Liquation : tin
 - c) Van Arkel : zirconium
 - d) Mond's process : lead
76. Hoope's process is used in the refining of
- a) Al
 - b) Zn
 - c) Ag
 - d) Cu
77. In Deacon's process the catalyst used is
- a) V₂O₅
 - b) CuCl₂
 - c) PtCl₄
 - d) FeCl₃
78. In which of the following arrangement, the order is not according to property indicated against it?
- a) F₂ > Cl₂ > Br₂ > I₂, Oxidising agent
 - b) F > Cl > Br > I, Electronegativity
 - c) F > Cl > Br > I, Electron gain enthalpy
 - d) F < Cl < Br < I, Density
79. Which of the following interhalogen compounds is T-shaped?
- a) ClF₃
 - b) BrF₅
 - c) IF₇
 - d) CIF
80. Oxidation number of nitrogen in which among the oxides of nitrogen is the lowest?
- a) Nitric oxide
 - b) Nitrous oxide
 - c) Nitrogen dioxide
 - d) Nitrogen trioxide
81. Which oxyacid of sulphur contains S-S single bond?
- a) Oleum
 - b) Marshall's acid
 - c) Dithionic acid
 - d) Thiosulphuric acid
82. Haber's process is used for the production of which of the following ?
- a) NH₃
 - b) HNO₃
 - c) H₂SO₄
 - d) O₃
83. The laughing gas is
- a) N₂O₄
 - b) NO
 - c) N₂O
 - d) N₂O₅
84. Which of the following statements is not true?
- a) On passing H₂S through acidified K₂Cr₂O₇ solution, a milky colour is observed.
 - b) K₂Cr₂O₇ is not used as primary standard in volumetric analysis.
 - c) K₂Cr₂O₇ solution becomes yellow on increasing pH beyond 7
 - d) K₂Cr₂O₇ solution in acidic medium is orange
85. Magnetic moment 2.83 BM is given by which of the following ions?
- (At. Nos. Ti = 22, Cr = 24, Mn = 25, Ni = 28)
- a) Ti³⁺
 - b) Ni²⁺
 - c) Cr³⁺
 - d) Mn²⁺
86. [Cu(NH₃)₄]²⁺ shows the following hybridization
- a) *dsp*²
 - b) *sp*²*d*
 - c) *dsp*³
 - d) *sp*³
87. Which of the following complexes has lowest molar conductance?
- a) CoCl₃ . 3 NH₃
 - b) CoCl₃ . 4NH₃
 - c) CoCl₃ . 5 NH₃
 - d) CoCl₃ . 6 NH₃
88. The IUPAC name of the compound
- 
- a) 1-bromo-1-chloro-4, 4'-bicyclobutane b) 4-(4'-chlorocyclobutyl)-1-bromocyclobutane
 c) 3-bromo-3'-chloro-1, 1'-bicyclobutane d) 4-(4'-bromocyclobutyl)-1-chlorocyclobutane

89. Alkaline hydrolysis of which among the following compounds leads to the formation of a racemate?

- a) 1-bromo-1-phenylethane b) 1-Chloro-3-methylbutane
c) Bromoethane d) 1-Chloropropane

90.



The IUPAC name of B is

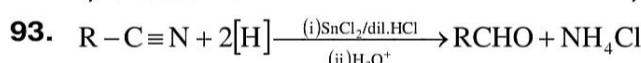
- a) 3-methylbutan-2-ol b) 2-methylbutan-3-ol
c) 2-methylbutan-2-ol d) Pentan-2-ol

91. Reaction of which among the following ethers with HI in cold leads to the formation of methyl alcohol?

- a) Ethyl methyl ether b) Methyl propyl ether
c) Isopropyl methyl ether d) *tert*-Butyl methyl ether

92. Which of the following acids does not contain $-\text{COOH}$ group?

- a) Carbamic acid b) Barbituric acid
c) Lactic acid d) Succinic acid



This reaction is known as

- a) Etard reaction b) Stephen reaction
c) Hell-Vohland-Zelinsky reaction d) Balz-Schiemann reaction

94. Aldoxime on reduction with $\text{Na} + \text{C}_2\text{H}_5\text{OH}$ forms

- a) 1° amine b) 2° amine c) 3° amine d) alcohol

95. Which one is not the reaction of diazonium salt?

- a) Sandmeyer reaction b) Gattermann reaction
c) Balz-Schiemann reaction d) Claisen reaction

96. Glucose on reaction with Br_2 water gives

- a) Glucaric acid b) Gluconic acid c) Saccharic acid d) Citric acid

97. Which of the following proteins is globular?

- a) Collagen b) Albumin c) Myosin d) Fibroin

98. Ziegler-Natta catalyst catalyses preparation of which of the following compounds?

- a) Preparation of Ti-metal b) Preparation of low density plastic
c) Preparation of high resistance plastic d) Preparation of high density plastic

99. Which polymer among the following polymers does not soften on heating?

- a) Bakelite b) Polythene
c) Polystyrene d) PVC

100. Progesterone and oestrogens are used as

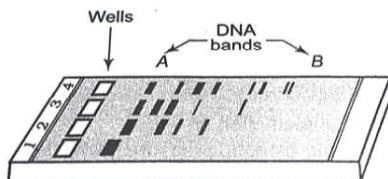
- a) antacids b) antifertility drugs
c) antimicrobials d) antibiotics

BIOLOGY

101. Bacteria are grouped in which one of the following Kingdom?
- a) Protista b) Plantae c) Animalia d) Monera
102. Which of the following have cell wall ?
- a) Monerans b) Plants c) Fungi d) Animals
103. Which type of place is most likely to have members of kingdom-Fungi?
- a) Cold and wet b) Hot and dry c) Warm and humid d) Cold and humid
104. Which of the following is a saturated fatty acid?
- a) Stearic acid b) Oleic acid
c) Linoleic acid d) Linolenic acid
105. Match the following columns and choose the correct option.
- | Column I | Column II |
|------------------------|-----------------------------|
| A. Simple proteins | 1. Glycolipids, lipoprotein |
| B. Conjugated proteins | 2. Albumin, globulin |
| C. Conjugated lipids | 3. Steroids, terpens |
| D. Derived lipids | 4. Haemocyanin, cytochrome |
- Codes
- | | A | B | C | D | | A | B | C | D |
|----|---|---|---|---|----|---|---|---|---|
| a) | 1 | 2 | 3 | 4 | b) | 2 | 4 | 3 | 1 |
| c) | 2 | 4 | 1 | 3 | d) | 2 | 3 | 1 | 4 |
106. Which pair amongst the following contain purines ?
- a) Cytosine and thyamine b) Adenine and thiamine
c) Adenine and guanine d) Cytosine and guanine
107. Which of the following pathway is particularly through cell wall?
- a) Apoplast pathway b) Vacuolar pathway
c) Symplast pathway d) Both a) and c)
108. The pathway of water movement, involving living part of a cell is
- a) apoplast pathway b) symplast pathway
c) transmembrane pathway d) lateral conduction
109. At the endodermis, water movement via apoplast is interrepted because of
- a) caspian strip b) plasma membrane
c) low water potential d) low turgor pressure

- 110.** The plant hormones which promote growth are
 a) gibberellins and ethylene
 b) auxin, gibberellin and cytokinin
 c) abscisic acid, ethylene and gibberellin
 d) auxins, cytokinins and abscisic acid
- 111.** Auxin synthesis occurs in
 a) root/shoot tips b) cortex c) xylem d) phloem
- 112.** Choose the natural auxin of the following.
 a) antiauxin b) NM c) 2, 4-D d) indole acetic acid
- 113.** Golgi apparatus is rich in
 a) Protein and phospholipids b) DNA and proteins c) Lipids and DNA d) All of the above
- 114.** The cell organelle involved in cellular respiration is
 a) mitochondria b) nucleus c) chloroplast d) ribosome
- 115.** Which one of the following is not a connective tissue fibre ?
 a) Collagen fibre b) Reticular fibre c) Elastic fibre d) Muscle fibre
- 116.** Adipose tissue stores
 a) protein b) carbohydrates c) Fat droplets d) All of these
- 117.** The middle part of small intestine is
 a) duodenum b) jejunum c) ileum d) pyloric region
- 118.** Which is incorrectly matched ?
 a) Rennin-liver b) Ptyalin-mouth c) Pepsin-stomach d) Trypsin-intestine
- 119.** Which structures are responsible for breathing process ?
 a) Trachea and alveoli b) Larynx and bronchi
 c) Ribs and intercostal muscles d) Intercostal muscles and diaphragm
- 120.** In human beings, rib cage and sternum move upwardly and outwardly during
 a) exercise b) sudden back injury c) expiration d) inspiration
- 121.** Sickle-cell anaemia has not been eliminated from the African population because
 a) It is controlled by recessive genes b) It is not a foetal disease
 c) It provides immunity against malaria d) It is controlled by dominant genes
- 122.** Probability of the genotype TTrr in F₂- generation of a dihybrid cross is
 a) $\frac{1}{16}$ b) $\frac{4}{16}$ c) $\frac{9}{16}$ d) $\frac{6}{16}$
- 123.** In a cross between red kernelled and white kernelled varieties of wheat showing polygenic inheritance, the phenotypic ratio in F₂- generation will be
 a) 1: 6:15: 20: 6:1 b) 1:4:6:4:1 c) 1:2:1 d) 2:1
- 124.** How many types of gametes will be produced by an individual having genotype AaBbcc?
 a) four b) three c) two d) one
- 125.** Which of the following cross will give recessive progeny in F₁- generation?
 a) TT × tt b) Tt × TT c) tt × tt d) TT × TT

- 126.** Which one of the following makes use of RNA as a template to synthesize DNA?
- a) Reverse transcriptase
 - b) DNA dependent RNA polymerase
 - c) DNA polymerase
 - d) RNA polymerase
- 127.** In a hair pin model of RNA, which nitrogen base is present at the short end?
- a) adenine
 - b) guanine
 - c) thymine
 - d) cytosine
- 128.** The replication of DNA takes place during
- a) S-phase
 - b) prophase
 - c) metaphase
 - d) anaphase
- 129.** Degeneracy of genetic code is due to
- a) Functional 61 codons and 20 amino acids
 - b) Functional 64 codons and 20 amino acids
 - c) Functional 20 codons and 20 amino acids
 - d) Functional 20 codons and 61 amino acids
- 130.** Transforming principle in Griffith's experiment was DNA. It was discovered by
- a) Zinder and Lederberg
 - b) Avery, MacLeod and McCarty
 - c) Lederberg and Tatum
 - d) Zinder and Tatum
- 131.** Study the given figure carefully and select the correct statements regarding this



- I. It represents typical agarose gel electrophoresis which shows differential migration of DNA fragments.
- II. Lane 1 contains undigested DNA fragments.
- III. Lanes 2 to 4 contain digested DNA fragments.
- IV. Smallest DNA bands are present at A position and largest DNA bands are present at B position.

Choose the correct option.

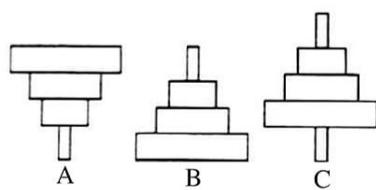
- a) I, II and III
- b) I, II and IV
- c) II and III
- d) III and IV

- 132.** Which vector can also be a small fragment of DNA?
- a) Plasmid
 - b) Bacterial artificial chromosome
 - c) Cosmid
 - d) Yeast artificial chromosome
- 133.** The *Bt* toxin is
- a) fat
 - b) protein
 - c) lipid
 - d) enzyme
- 134.** Which of the following components are not used in gel electrophoresis?
- a) Ethidium bromide
 - b) Restriction endonuclease
 - c) Agarose
 - d) X- radiations

- 135.** In protoplast fusion, the enzymes required are
- cellulase, hemicellulase, pectinase
 - pectinase
 - ligase, hemicellulase
 - hemicellulose
- 136.** In callus culture, roots can be induced by the use of
- auxin
 - cytokinin
 - gibberellin
 - ethylene
- 137.** Which of the following enhances or induces fusion of protoplasts?
- Sodium chloride and potassium chloride.
 - Polyethylene glycol and sodium nitrate
 - IAA and kinetin
 - IAA and gibberellins
- 138.** Which one of the following is an example of cleistogamy ?
- Sunflower
 - Vallisneria
 - Commelina
 - Calotropis
- 139.** Disadvantages of chemical agents are
- chemicals are toxic and harmful to human beings and animals
 - chemicals pollute the environment and plants
 - weedicides used to remove weeds also pollute the soil
 - All of the above
- 140.** Which one of the following is NOT a mycoherbicide ?
- Phytophthora palmivora
 - Xanthomonas sp.
 - Alternaria crassa
 - Fusarium sp.
- 141.** The microbe Pseudomonas denitrificans produces Vitamin
- K
 - D
 - B₂
 - B₁₂
- 142.** The initial step in preparation of beer is
- malting
 - carboxylation
 - clarification
 - distillation
- 143.** Every CO₂ molecule entering the Calvin cycle needs
- 2 molecule of NADPH and 3 molecule of ATP for its fixation
 - 2 molecule of NADPH and 2 molecule of ATP for its fixation
 - variable amount of ATP
 - only NADPH
- 144.** RuBP carboxylase enzyme catalyses the carboxylation reaction between
- CO₂ and ribulose, 1, 5-diphosphate
 - acetyl Co-A and oxaloacetic acid
 - PGA and dihydroxy acetone phosphate
 - ribulose diphosphate and phosphoglyceraldehyde
- 145.** In Calvin cycle, if one molecule of RuBP is carboxylated than how many PGA molecule will be formed ?
- 2
 - 3
 - 4
 - 5

- 146.** C₄-plants differ from C₃-plants in respect to
a) number of CO₂ molecules used
b) substrate, which accept the CO₂ molecules
c) the final product
d) number of ATP formed
- 147.** Chloroplasts, with pyrenoid-like structures are found in the leaves of
a) Funaria b) Cycas c) Selaginella d) Zea mays
- 148.** In which one of the following reaction, oxidative decarboxylation does not occur ?
a) Malic acid → Pyruvic acid
b) Pyruvic acid → Acetyl Co-A
c) Glyceraldehyde 3-phosphate → 1, 3-bisphosphoglyceric acid
d) α -ketoglutaric acid → Succinic Co-A
- 149.** Respiration may occur in absence of oxygen in
a) Potato
b) Spirogyra
c) Yeast
d) Humans
- 150.** RQ is measured by
a) Mercury manometer
b) Respirometer
c) Auxanometer
d) Calorimeter
- 151.** The ovule in which the funicle, chalaza and micropyle lie in one vertical plane is called
a. campotropous b. amphitropous
c. orthotropous d. anatropous
- 152.** Egg apparatus consists of
a. 2 synergids + 2 eggs b. 2 synergids + 2 eggs
c. 2 synergids + 1 egg d. 2 synergids + 4 eggs
- 153.** A gymnospermic leaf has 12 chromosomes. What will be the chromosome number in its endosperm?
a. 6 b. 12 c. 18 d. 24
- 154.** Endosperm is consumed by developing embryo in the seed of
a. pea b. maize c. coconut d. castor

155. Which of the following representations show the pyramid of numbers in a grassland ecosystem?



- a. A b. B c. C d. None of these
156. Which among the following nutrient cycle lacks an atmospheric component?
- a. Water cycle b. Carbon cycle
c. Phosphorous cycle d. Nitrogen cycle
157. The main reservoir of sedimentary cycles is
- a. oceans b. atmosphere c. soil d. All of these
158. In plant succession, when climax community is reached, the net productivity
- a. continues to increase b. becomes zero
c. becomes reduced d. becomes stable
159. The origin of mammals-like reptiles occurred in
- a) Triassic period b) Permian period c) Jurassic period d) Tertiary period
160. The brain capacity of Homo erectus was about
- a) 650 cc b) 900 cc c) 1200 cc d) 1400 cc
161. Connecting link between ape and man is
- a) Cro-magnon man b) Australopithecus c) Neanderthal man d) Lemur
162. Experimental proof that some simple molecules like H₂, NH₃, CH₄, H₂O gave rise to amino acids during origin of life was provided by
- a) Lamarck b) Stanley Miller c) Harold Urey d) Both (b) and (c)
163. The formation of two species form one ancestral species is known as
- a) Convergent evolution b) Phyletic evolution c) allopatry d) divergent evolution
164. The genes located in the same chromosome do not separate and are inherited together over its generations due to the phenomenon of
- a) complete linkage b) incomplete linkage
c) incomplete recombination d) complete recombination
165. When the number of recombinant progeny is usually less than the number expected in independent assortment it is called
- a) complete linkage b) incomplete linkage
c) complete recombination d) complete independent assortment
166. Linkage groups are always present on the
- a) homologous chromosomes b) analogous chromosomes
c) sex chromosomes d) heterologous chromosomes

- 167.** Select the correct statement from the ones given below with respect to dihybrid cross.
- Tightly linked genes on the same chromosome show higher recombinations
 - Genes far apart on the same chromosome show very few recombinations
 - Genes loosely linked on the same chromosome show similar recombinations as the tightly linked ones
 - Tightly linked genes on the same chromosome show very few recombinations

- 168.** Match the following columns.

Column I	Column II
A. Gene therapy	i. Effort to fix functional gene
B. Humulin	ii. A single-stranded DNA or RNA tagged with a radioactive molecule
C. Probe	iii. Diagnostic test
D. ELISA	iv. Diabetes

Codes

A B C D

a) 1 4 2 3

c) 2 3 1 4

A B C D

b) 4 2 3 1

c) 3 1 4 2

- 169.** In India, research in genetic modification of organisms and safety issues are controlled by

a) DBT b) IARI c) CSIR d) GEAC

- 170.** Which is correct regarding genetically engineered insulin using *E.coli*?

- Difficult to purify
- Obtained in large unlimited quantities
- Possibility of transmission of animal diseases
- Insulin obtained varies in chemical structure

- 171.** Which of the following is utilized to promote growth and formation of blood vessels so as to heal wounds?

a) Humulin b) TPA c) TGF- β d) α -1-antitrypsin

- 172.** Cancerous cells spread through

- lymph
- blood
- secondary growths of malignant tumour
- All of the above

- 173.** Which type of cancer is found in lymph nodes and spleen ?

a) Carcinoma b) Sarcoma c) Leukaemia d) Lymphoma

- 174.** The combination of surgery, radiotherapy and chemotherapy can help to treat

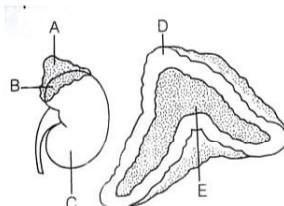
a) cancer b) AIDS c) Both (a) and (b) d) None of these

- 175.** Which of the following is an example of carcinoma ?
a) Melanoma cancer of skin b) Cancer of lymph gland
c) Cancer of muscle d) Cancer of blood
- 176.** In MOET procedure to induce follicular maturation and super-ovulation which of the following hormones are administered to the cow?
a) Follicle stimulating hormone b) Progesterone
c) Androgen d) Oxytocin
- 177.** Which of the statements is incorrect?
a) The maintenance of hives for the production of lac is called apiculture.
b) A group of animals related by descent and similar in most characters are called a breed.
c) The agriculture practice of breeding and raising livestock is called animal husbandry.
d) Lac is secreted by female insect.
- 178.** Honey has the largest percentage of
a) water b) starch c) glucose d) sucrose
- 179.** Isinglass, a type of by product of fish industry is principally used for
a) feeding cattle, pigs and poultry b) preparation of paints and varnishes
c) clarification of vinegar, wines and beer d) production of insulin
- 180.** Which is true for honey bee?
a) Queen is sterile haploid female b) Workers are diploid males and females
c) Bee hive has four types of bees d) Drones are haploid fertile males
- 181.** Deposition of cholesterol in arteries is called
a. sclerosis b. atherosclerosis c. cirrhosis d. hypotension
- 182.** During the process of blood coagulation vitamin-K helps in
a. the formation of prothrombin
b. the formation of thromboplastin
c. the conversion of fibrinogen into fibrin
d. the conversion of prothrombin into thrombin
- 183.** At high altitudes, RBCs in human blood
a. increase in size b. decrease in size
c. increase in number d. decrease in number
- 184.** Cardiac output is determined by
a. heart rate b. stroke volume
c. blood flow d. Both (a) and (b)
- 185.** Reabsorption of water in DCT and CT part of nephron is function of
a) prolactin b) oxytocin
c) vasopressin d) luteinising hormone
- 186.** Functioning of kidney is efficiently regulated by
a) ANF b) JGA c) Both (a) and (b) d) Lungs

- 187.** Uremia is accumulation of urea in
a) liver b) blood c) kidney d) bone joint

- 188.** Haematuria means
a) RBC in the urine b) WBC in the urine
b) Both (a) and (b) d) large amount of urine

- 189.** Identify A to E in the following figure and choose the correct option



- a) A- Adrenal gland; B-Fat; C-kidney; D-adrenal cortex; E – Adrenal medulla
- b) A-Fat; B-Adrenal gland; C-kidney; D-Adrenal cortex; E- Adrenal medulla
- c) A-Fat; B-Adrenal gland; C-kidney; D-Adrenal medulla; E-adrenal cortex
- d) A- Adrenal gland; B-Fat; C-kidney; D-Adrenal medulla; E-Adrenal cortex

- 190.** Immune response of old age person becomes weak due to the degeneration of ---- gland.
a) Thyroid b) parathyroid c) thymus d) hypothalamus

- 191.** Hormone receptors are present
a) On the cell membrane b) Outside the target cell
c) Inside the target cell d) Both (a) and (c)

- 192.** Prostaglandins are
I. Fatty in nature.
II. Proteinaceous in nature.
III. Steroidal in nature
IV. Glycoproteinaceous in nature.
Choose the correct option.

- a) Only I b) I and III c) II and IV d) Only IV

- 193.** Which of the following is devoid of glands?
a) Uterus b) Vagina c) Vulva d) Oviduct

- 194.** Mammary glands are modified
a) sweat gland b) sebaceous gland
c) lacrimal gland d) endocrine gland

- 195.** Accessory sexual character in female is promoted by
a) androgen b) progesterone
c) oestrogen d) testosterone

- 196.** How many sperms are formed by four primary spermatocytes?
a) 1 b) 4 c) 16 d) 32

- 197.** Which one of the following is not used for ex situ plant conservation?
- a. Field gene banks
 - b. Seed banks
 - c. Shifting cultivation
 - d. Botanical gardens
- 198.** Inward flow of population is called
- a. immigration
 - b. Emigration
 - c. Mortality
 - d. Natality
- 199.** CO is more toxic than CO₂ because
- a. it affects the nervous system
 - b. it damages lungs
 - c. it reduces the oxygen carrying capacity of haemoglobin
 - d. it forms acid with water
- 200.** High value of BOD (Biochemical Oxygen Demand) indicates that
- a. water is pure
 - b. water is highly polluted
 - c. water is less polluted
 - d. consumption of organic matter in the water is higher by the microbes

Together, we will make a difference.