ALLEN CAREER INSTITUTE KOTA (RAJASTHAN)
path to success
BENGALURU, KARNATAKA

MOCK TEST

EXAM DATE : 25.11.2017

CODE B

CAREER utsav '17 careers after +2
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Q.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	3	3	2	3	2	4	1	4	2	2	3	4	2	1	2
Q.No	16	17	18	19	20	21	22	23	24	25					
Ans	2	2	2	2	3	1	4	2	2	1					
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Q.NO	41	42	43	44	45	46	47	48	49	50					
Ans	3	2	2	4	1	3	2	2	2	4					
Q.NO	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
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Q.NO	111	112	113	114	115	116	117	118	119	120					
Ans	3	4	2	4	1	4	4	4	2	4					

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Ans	3	3	2	3	2	4	1	4	2	2	3	4	2	1	2
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Q.NO	111	112	113	114	115	116	117	118	119	120					
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Q.NO	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
Ans	3	2	4	3	1	2	2	3	2	4	3	3	3	3	3
Q.NO	111	112	113	114	115	116	117	118	119	120					
Ans	3	4	2	4	1	4	4	4	2	4					

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MOCK TEST

PAPER CODE **B**

EXAM DATE : 25.11.2017

TIME
1.30 Hours (PCM)
1.30 Hours (PCB)

FORM NUMBER : | | | | |

MAXIMUM MARKS
PCM - 80 MARKS
PCB - 90 MARKS

ANSWER KEY & SOLUTION

1. Two bodies of masses m_1 and m_2 are connected by a light string passing over a smooth light fixed pulley. The acceleration of the system is g/7. The ratio of their masses is

(1) 7 : 1 (2) 7 : 2
(3) 4 : 3 (4) 4 : 5

Ans. 3

Sol. $$a = \frac{m_1 - m_2}{m_1 + m_2} g = \frac{g}{7}$$

$$7m_1 - 7m_2 = m_1 + m_2$$
$$6m_1 = 8m_2$$

or, $$\frac{m_1}{m_2} = \frac{4}{3}$$

2. In an a.c. circuit, V & I are given by

V = 100 sin (100 t) volt.

I = 100 sin (100 t + π/3) mA.

The power dissipated in the circuit is :

(1) 10^4 watt (2) 10 watt
(3) 2.5 watt (4) 5 watt

Ans. 3

Sol. $P = V_{rms} I_{rms} \cos\phi$

$$= \frac{100}{\sqrt{2}} \cdot \left(\frac{100}{\sqrt{2}} \times 10^{-3} \right) \cos 60^\circ$$

$$= \frac{10}{2} \times \frac{1}{2} = 2.5 \text{ watt}$$

3. A metal rod moves at a constant velocity in a direction perpendicular to its length. A constant, uniform magnetic field exists in space in a direction perpendicular to the rod as well as its velocity. Select the correct statement (s) from the following

(1) The entire rod is at the same electric potential
(2) There is an electric field in the rod
(3) The electric potential is highest at the center of the rod and decreases towards its ends
(4) The electric potential is lowest at the center of the rod and increases towards its ends.

Ans. 2

Sol. According to Faraday's law, an induced emf is set up on the rod whose magnitude is B*l*v. Thus, an electric field is generated in the rod. The electric potential varies uniformly along the rod.

4. The magnetic flux through a coil varies with time as $\phi = 5t^2+6t+9$. The ratio of emf at t = 3s to t = 0s will be

(1) 1 : 9 (2) 1 : 8
(3) 6 : 1 (4) 9 : 1

Ans. 3

Sol. $$\frac{d\phi}{dt} = 10t + 6$$

$$e = -\frac{d\phi}{dt} = -(10t + 6)$$

$$e|_{t=3} = -(10 \times 3 + 6) = -36$$
$$e|_{t=0} = -(10 \times 0 + 6) = -6$$

$$\frac{e_{t=3}}{e_{t=0}} = \frac{-36}{-6} = \frac{6}{1}$$

5. A current I flows along the length of an infinitely long, straight, thin-walled pipe. Then

(1) The magnetic field at all points outside the pipe is the same.

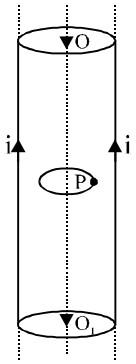
(2) The magnetic field at any point inside the pipe is zero

(3) The magnetic field is zero only on the axis of the pipe

(4) The magnetic field is different at different points inside the pipe.

Ans. 2

Sol. Fig. shows infinitely, long, straight, thin-walled pipe carrying current I.



Let P be any point at a distance r from the axis OO_1 of the pipe. Let B be magnetic field at P. Consider a closed circular path passing through point P as shown in figure. From Ampere's Circuital Theorem, $\oint B.dl = \mu_0 i$

i = current through the closed path. Obviously, i = 0

$\therefore \quad 2\pi r.B \quad 0$ or $B = 0$

6. A thin equiconvex lens of refractive index 3/2 and radius of curvature 30 cm is put in water (refractive index $= \frac{4}{3}$). Its focal length is

(1) 0.15 m (2) 0.30m

(3) 0.45 m (4) 1.20 m

Ans. 4

Sol. $\frac{1}{f} = \left(\frac{\mu_1}{\mu_2} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$\frac{1}{f} = \left(\frac{3/2}{4/3} - 1\right)\left(\frac{1}{0.3} + \frac{1}{0.3}\right)$

or $\frac{1}{f} = \left(\frac{9}{8} - 1\right)\left(\frac{2}{0.3}\right)$

or $\frac{1}{f} = \frac{1}{8} \times \frac{2}{0.3}$

or $f = 1.20\,m$

7. A ray of light falls on a transparent glass slab with refractive index (relative to air) of 1.62. The angle of incidence for which the reflected and refracted rays are mutually perpendicular is:

(1) $\tan^{-1}(1.62)$ (2) $\sin^{-1}(1.62)$

(3) $\cos^{-1}(1.62)$ (4) None of these

Ans. 1

Sol. we know that

$\mu = \frac{\sin i}{\sin r}$ and $i + r = 90^\circ$

or $r = 90 - i$

$\mu = \frac{\sin i}{\sin(90 - i)} = \tan i$

or $i = \tan^{-1}(\mu) = \tan^{-1}(1.62)$

8. Three resistances R, 2R and 3R are connected in parallel to a battery. Then

(1) The potential drop across 3R is maximum

(2) The current through each resistance is same

(3) The heat developed in 3R is maximum

(4) The heat developed in R is maximum.

Ans. 4

Sol . In parallel combination, potential drop across each resistance is same.

Heat developed $= \frac{V^2}{R}$

$H_1 = \frac{V^2}{R}$ $H_2 = \frac{V^2}{2R}$

$H_3 = \frac{V^2}{3R}$

$\therefore$ Heat developed in resistance R is maximum.

9. A mass of 1 kg is acted upon by a single force $\vec{F} = (4\hat{i} + 4\hat{j})N$. Due to force, mass is displaced from (0, 0) to (1m, 1m). If initially the speed of the particle was 2 m/s, its final speed should approximately be

(1) 9 m/s (2) 4.5 m/s

(3) 15 m/s (4) 7.2 m/s

Ans. 2

Sol. $W_{net} \int \vec{F}.d\vec{r} \int_{0m}^{1m} 4dx \int_{0m}^{1m} 4dy \quad 8J$

and $W_{net} = DK$

$\Rightarrow \quad 8 = \frac{1}{2}(1)\times v^2 - \frac{1}{2}(1)(2)^2$

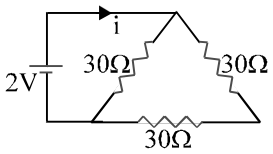
$\Rightarrow \quad v = 4.5 \text{ m/s}$

10. The angular acceleration of a particle moving along a circular path with uniform speed is
(1) Uniform but non-zero
(2) Zero
(3) Variable
(4) Such as cannot be predicted from the given information.

Ans. 2

Sol. As angular speed of the particle is constant and hence angular acceleration is zero.

11. The current i in the battery (see figure) is



(1) $\frac{1}{45}$amps (2) $\frac{1}{15}$amps

(3) $\frac{1}{10}$amps (4) $\frac{1}{5}$amps

Ans. 3

Sol. $\frac{1}{R_{eq}} = \frac{1}{30} + \frac{1}{60} = \frac{90}{30\times 60} \quad R_{eq} = 20$

$V = IR$

$I = \frac{2}{20} = 0.1 \text{ Amp.}$

12. Two identical metal plates are given positive charges Q_1 and Q_2 ($<Q_1$) respectively. If they are now brought close together to form a parallel plate capacitor with capacitance C, the potential difference between them is :

(1) $\frac{Q_1 + Q_2}{2C}$ (2) $\frac{Q_1 + Q_2}{C}$

(3) $\frac{Q_1 - Q_2}{C}$ (4) $\frac{Q_1 - Q_2}{2C}$

Ans. 4

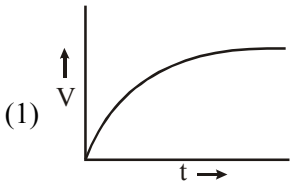
Sol. Within the capacitor,

$E_1 = \frac{Q_1}{2\varepsilon_0 A}; E_2 = \frac{Q_2}{2\varepsilon_0 A}$

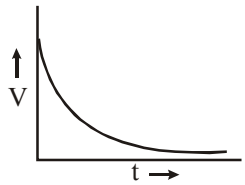
$E = E_1 - E_2 = \frac{1}{2\varepsilon_0 A}(Q_1 - Q_2)$

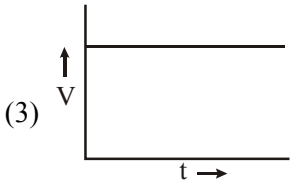
Hence, $V = Ed = \frac{1}{2}\frac{d}{\varepsilon_0 A}(Q_1 - Q_2) = \frac{Q_1 - Q_2}{2C}$.

13. An ideal cell is connected to a capacitor and a voltmeter in series. The reading V of the voltmeter (added in parallel with resistor) is plotted against time. Which of the following best represents the resulting curve?

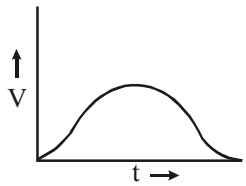
(1) 

(2)



(3) 

(4)

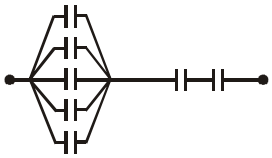


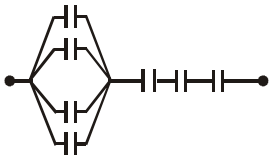
Ans. 2

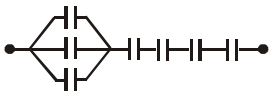
Sol. This is basically an RC circuit, charging from a cell. The resistance (R) of the voltmeter is the resistance in the circuit. The voltage across R = circuit current $\times$ R = reading of the voltmeter (V). Thus the nature of the V-t curve is the same as the nature of the

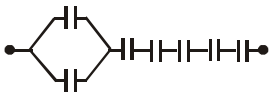
I-t curve.

14. Seven capacitors each of capacitance $2\mu F$ are to be connected in a configuration to obtain an effective capacitance of $(10/11)\mu F$. Which of the combination(s), shown in figure below, will achieve the desired result ?

(1) 

(2) 

(3) 

(4) 

Ans. 1

Sol. (1) $\frac{1}{C}=\frac{1}{5\times 2}+\frac{2}{2}=\frac{11}{10}$ or $C=\frac{10}{11}\mu F$

(2) $\frac{1}{C}=\frac{1}{4\times 2}+\frac{3}{2}=\frac{13}{8}$ or $C=\frac{8}{13}\mu F$

(3) $\frac{1}{C}=\frac{1}{3\times 2}+\frac{4}{2}=\frac{13}{6}$ or $C=\frac{6}{13}\mu F$

(4) $\frac{1}{C}=\frac{1}{2\times 2}+\frac{5}{2}=\frac{11}{4}$ or $C=\frac{4}{11}\mu F$.

15. A 6000 kg rocket is set for vertical firing. If the exhaust speed is 1000 ms^{-1}, the amount of gas that must be ejected per second to supply the thrust needed to overcome the weight of the rocket is ($g = 10\ ms^{-1}$).

(1) 30 kg (2) 60 kg

(3) 75 kg (4) 90 kg.

Ans. 2

Sol. $M_0 g = \text{Thrust} = v\frac{dM}{dt}$

$\Rightarrow \frac{dM}{dt}=\frac{M_0 g}{v}=\frac{6000x10}{1000}kgs^{-1}$

$\Rightarrow \frac{dM}{dt}=\frac{60000}{1000}=60\,kgs^{-1}$

16. During adiabatic process pressure (P) versus density (ρ) equation is

(1) $P.\rho^{\gamma}=\text{constant}$ (2) $P.\rho^{-\gamma}=\text{constant}$

(3) $P^{\gamma}.\rho^{1+\gamma}=\text{constant}$ (4) $P^{1/\gamma}.\rho^{\gamma}=\text{constant}$

Ans. 2

Sol. In adiabatic process

$PV^{\gamma}=\text{constant}$ ... (1)

Density $\rho=\frac{m}{V}$

or $\rho \propto V^{-1}$

$\therefore$ equation (1) can be written as constant

17. A charge is situated at a certain distance from an electric dipole in the end-on position(i.e along the axis of dipole) experiences a force F. if the distance of the charge is doubled, the force acting on the charge will be :

(1) F/4 (2) F/8

(3) 2F (4) F/2

Ans. 2

Sol. $E=\frac{1}{4\pi_0\varepsilon}\frac{2p}{r^3}$

$E\propto\frac{1}{r^3}\Rightarrow F\propto\frac{1}{r^3}$

Hence, the force will become F/8

18. The current in an L – R circuit builds up to $3/4^{th}$ of its steady state value in 4 seconds. The time constant of this circuit is

(1) $\frac{1}{\ln 2}\sec$ (2) $\frac{2}{\ln 2}\sec$

(3) $\frac{3}{\ln 2}\sec$ (4) $\frac{4}{\ln 2}\sec$.

Ans. 2

Sol. $I=I_0(1-e^{-t/\tau})$ where $\tau\rightarrow$ time constant

$\therefore \quad \frac{3}{4}I_0=I_0(1-e^{-t/\tau})$

$\Rightarrow \quad \frac{3}{4}=1-e^{-t/\tau}$

$\Rightarrow \quad e^{-t/\tau}=\frac{1}{4}$

$$\Rightarrow \quad \frac{-t}{\tau} \quad \ln\frac{1}{4}$$

$$\Rightarrow \quad \frac{-4}{\tau} = -2\ln 2$$

$$\Rightarrow \quad \tau = \frac{2}{\ln 2}$$

19. Two point charges +q and –q are held fixed at (-d, 0) and (d, 0) respectively of a (X, Y) coordinate system. Then

(1) The electric field $\vec{E}$ at all points on the X-axis has the same direction.

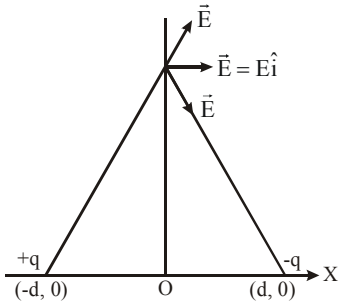
(2) $\vec{E}$ at all points on the Y-axis is along $\hat{i}$.

(3) Work has to be done in bringing a test charge from infinity to the origin.

(4) The dipole moment is qd directed along $\hat{i}$.

Ans. 2

Sol.



The diagrammatic representation of the given problem is shown in fig.

The electrical field $\vec{E}$ at all points on the X-axis will not have the same direction.

The electrical field $\vec{E}$ at all points on the Y-axis will be parallel to the X-axis (i.e. $\hat{i}$ direction).

The electric potential at the origin due to both the charge is zero, hence, no work is done in bringing a test charge from infinity to the origin.

Dipole moment is directed from the –q charge to the +q charge (i.e. –x direction).

20. A geo-stationary satellite orbits around the earth in a circular orbit of radius 36000 km. Then, the time period of a spy satellite orbiting a few hundred kilometers above the earth's surface (R_{earth}=6400 km) will approximately be

(1) 5 hr (2) 16 hr

(3) 2 hr (4) 8 hr

Ans. 3

Sol. We know that

$$T^2 \propto R^3 \qquad \text{or} \qquad (T_2/T_1) = (R_2/R_1)^{3/2}$$

$$\text{or} \qquad \frac{T_2}{T_1} = \left(\frac{6400}{36000}\right)^{3/2}$$

$$\text{or} \qquad T_2 = \left(\frac{6400}{36000}\right)^{3/2} \times 24 \approx 2\,\text{hr}.$$

21. A traveling wave in a stretched string is described by the equation $y = A\sin(kx - \omega t)$. The maximum particle velocity is

(1) $A\omega$ (2) ω/k

(3) $d\omega/dk$ (4) x/t

Ans. 1

Sol :Particle velocity $|v| = \left|\frac{dy}{dt} = A\omega\cos(kx - \omega t)\right|$

$\therefore$ Maximum particle velocity $= A\omega$

22. A proton moving with a constant velocity passes through region of space without any change in its velocity. If E and B represent the electric and magnetic fields respectively, this region of space may have

(1) E = 0, B = 0 (2) E = 0, B $\neq$ 0

(3) E $\neq$ 0, B $\neq$ 0 (4) All of these

Ans. 4

Sol. As there is no acceleration, either E = 0, B = 0 or E $\neq$ 0, B $\neq$ 0 or E = 0, B $\neq$ 0.

23. In a transformer, $n_P = 500$, $n_S = 5000$. Input voltage is 20 V and frequency is 50 Hz. Then in the output, we have

(1) 200 V, 500 Hz (2) 200 V, 50 Hz

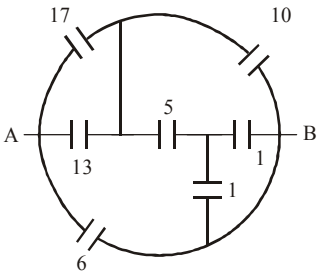
(3) 20 V, 5 Hz (4) 2 C, 5 Hz.

Ans. 2

Sol. $E_S = \frac{n_S}{n_P} \times E_P = \frac{5000}{500} \times 20 = 200$ V

Frequency is not affected by transformer.

24. Find equivalent capacitance across AB (all capacitances are in μF)



(1) $\frac{20}{3}\mu F$ (2) $9\mu F$

(3) $48\mu F$ (4) None

Ans. 2

Sol.

25. Two men A and B are sitting at the end of a plank of length L, if plank is rotating with angular velocity ω about an axis perpendicular to its length and passing through a point at a distance of L/3 from A. The angular velocity of B with respect to A is

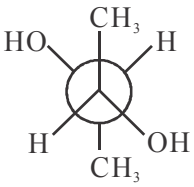
(1) ω (2) ωL/3

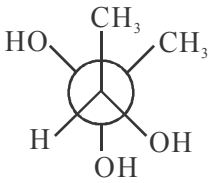
(3) $\frac{2\omega}{3}$ (4) 2ω

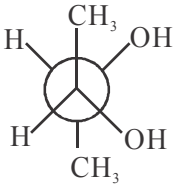
Ans. 1

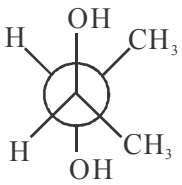
Sol. Angular velocity of a body about any point in it is same.

26. Which one of the following is the least stable conformer?

(1) 

(2) 

(3) 

(4) 

Ans. 4

27. The anions (A) form hexagonal closest packing and atoms (C) occupy only 2/3 of octahedral voids in it, then the general formula of the compound is

(1) CA (2) C_2A_2

(3) C_2A_3 (4) C_3A_2

Ans. 3

28. The correct order of boiling point is

(1) $CH_3I > CH_3Br > CH_3Cl > CH_3F$

(2) $CH_3Br > CH_3I > CH_3Cl > CH_3F$

(3) $CH_3F \quad CH_3Cl \quad CH_3Br \quad CH_3I$

(3) $CH_3Cl > CH_3F > CH_3I > CH_3Br$

Ans. 1

29. The correct order of hybridization of the central atom in the following species.

$NH_3, [PtCl_4]^{2-}, PCl_5$ and BCl_3 is

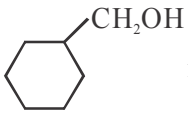
(1) dsp^2, dsp^3, sp^2 and sp^3

(2) sp^3, dsp^2, sp^3d, sp^2

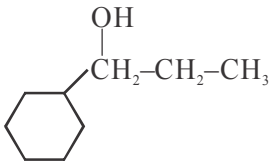
(3) dsp^2, sp^2, sp^3, dsp^3

(4) dsp^2, sp^3, sp^2, dsp^3

Ans. 2

30. 

is changed into



(1) Cu, 300°C (i) CH_3CH_2MgCl, H_3O^+

(2) CrO_3, H^+ (ii) CH_3CH_2MgCl, H_3O^+

(3) $KMnO_4$ (iii) CH_3CH_2MgCl, H_3O^+

(4) $Na_2Cr_2O_7 + H_2SO_4$ (iv) CH_3CH_2MgCl, H_3O^+

Ans. 1

31. The wt. of urea dissolved in 100 ml. solution which produce an osmotic pressure of 20.4 atm at 25°C, will be [S = 0.0821]

(1) 5 g (2) 4 g

(3) 3 g (4) 6 g

Ans. 1

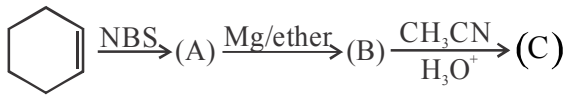
32. The ratio between the rms velocity of H_2 at 50 K and that of O_2 at 800 K is

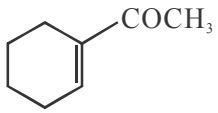
(1) 4 (2) 2

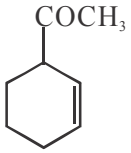
(3) 1 (4) 1/4

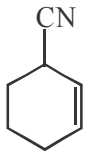
Ans.3

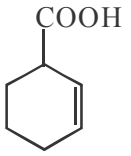
33. End product of the following sequence of reaction is



(1) 

(2) 

(3) 

(4) 

Ans. 2

34. In the sequence reaction,

$A \xrightarrow{K_1} B \xrightarrow{K_2} C \xrightarrow{K_3} D$, $K_3 > K_2 > K_1$, then the rate determining step of the reaction is

(1) $A \rightarrow B$ (2) $B \rightarrow C$

(3) $C \rightarrow D$ (4) $A \rightarrow D$

Ans. 1

35. Which is prussian blue?

(1) $KFe^{III}\left[Fe^{II}(CN)_6\right]$

(2) $KFe^{III}\left[Fe^{I}(CN)_6\right]$

(3) $K_2\left[Fe^{II}(CN)_6\right]$

(4) $K_3\left[Fe(CN)_6\right]$

Ans. 1

36. Charge required to liberate 11.5 g sodium is

(1) 0.5 F (2) 0.1 F

(3) 1.5 F (4) 96500 coulombs

Ans. 1

37. Which solution will have the highest boiling point?

(1) 1m $C_6H_{12}O_6$ solution (2) 1m *NaCl* solution

(3) 1m $BaCl_2$ solution (4) 1m $CO(NH_2)_2$ solution

Ans. 3

38. In which one of the following reactants K_P is less than K_C?

(1) $2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$

(2) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

(3) $PCl_{5\,g} \rightleftharpoons PCl_{3\,g} \quad Cl_{2\,g}$

(4) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

Ans. 2

39. The dative bond is present in

(1) NH_3 (2) SO_3

(3) CO_2 (4) BF_3

Ans.2

40. 20 ml of 0.2M $Al_2(SO_4)_3$ is mixed with 20 ml of 0.6 M $BaCl_2$ concentration of Al^{3+} ion in the solution will be

(1) 0.2 M (2) 10.3 M

(3) 0.1 M (4) 0.25 M

Ans. 1

41. The element with the highest first ionization potential is

(1) Boron (2) Carbon

(3) Nitrogen (4) Oxygen

Ans. 3

42. The correct order of equivalent conductance's at infinite dilution of *LiCl*, *NaCl*, *KCl* is

(1) *LiCl* > *NaCl* > *KCl*

(2) *KCl* > *NaCl* > *LiCl*

(3) *NaCl* > *KCl* > *LiCl*

(4) *LiCl* > *KCl* > *NaCl*

Ans. 2

43. In the extraction of copper from copper pyrites, iron is removed as

(1) $FeSO_4$ (2) $FeSiO_3$

(3) Fe_3O_4 (4) Fe_2O_3

Ans. 2

44. Which of the following is true regarding reversible adiabatic expansion of an ideal gas?

(1) Plot of T vs V is a straight line with slope equal to γ

(2) Plot of *l*nT vs *l*nV is a straight line with slope equal to γ

(3) Plot of *l*nT vs *l*nV is a straight line with slope equal to $-\gamma$

(4) Plot of *l*nT vs *l*nV is a straight line with slope $(1 - \gamma)$

Ans. 4

45. $FeSO_4$ solution gives brown colour ring in testing nitrates or nitrites. This is

(1) $\left[Fe(H_2O)_5 NO\right]^{2+}$

(2) $\left[Fe(H_2O)_5 NO_2\right]^{2+}$

(3) $\left[Fe\ H_2O\ _4\ NO\ _2\right]^{2}$

(4) $\left[Fe(H_2O)_4 NO\right]^{2+}$

Ans. 1

46. Among $\left[Ni\ CO\ _4\right], \left[Ni\ CN\ _4\right]^{2-}$ and $\left[NiCl_4\right]^{2-}$

(1) $\left[Ni\ CO\ _4\right]$ and $\left[NiCl_4\right]^{2-}$ are diamagnetic and $\left[Ni\ CN\ _4\right]^{2-}$ is paramagnetic

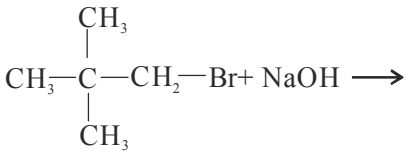
(2) $NiCl_4\ ^2$ and $\left[Ni\ CN\ _4\right]^{2-}$ are diamagnetic and $\left[Ni\ CO\ _4\right]$ is paramagnetic

(3) $\left[Ni\ CO\ _4\right]$ and $\left[Ni(CN)_4\right]^{2-}$ are diamagnetic and $NiCl_4$ is paramagnetic

(4) $\left[Ni(CO)_4\right]$ is diamagnetic and $\left[Ni(CN)_4\right]^{2-}, \left[NiCl_4\right]^{2-}$ are paramagnetic

Ans. 3

47. Consider the following reaction.



Total number of possible products in this reaction is

(1) Two (2) Four

(3) One (4) Three

Ans. 2

48. H_2 acts as an oxidant in its reaction with

(1) Br_2 (2) Ca

(3) N_2 (4) S

Ans.2

49. Primary and secondary valency of Pt in $\left[Pt(en)_2 Cl_2\right]Cl_2$ are :

(1) 4, 4 (2) 4, 6 (3) 6, 6 (4) 4, 2

Ans. 2

50. Which of the follwoing does not forms interstitial compounds

(1) Co (2) Ni (3) Fe (4) Ca

Ans. 4

51. If $1, \omega$ and ω^2 are three cube roots of unity, then the roots of equation $(x-1)^3 - 8 = 0$, are

(1) $-1, -1-2\omega, -1+2\omega^2$ (2) $3, 2\omega, 2\omega^2$

(3) $3, 1+2\omega, 1+2\omega^2$ (4) $3, 1-2\omega, 1-2\omega^2$

Ans:3

Sol: $\because (x-1)^3 = 8 \Rightarrow (x-1)^3 = 2^3$

$\Rightarrow \left(\frac{x-1}{2}\right)^3 = 1 \Rightarrow \frac{x-1}{2} = 1, \omega, \omega^2$

$\Rightarrow x-1 = 2, 2\omega, 2\omega^2$

$\Rightarrow x = 3, 1+2\omega, 1+2\omega^2$

52. If f(x) is a polynomial satisfying $f(x).f(1/x) = f(x) + f(1/x)$ and f(3) = 28, then f(4) is

(1) 63 (2) 65

(3) 17 (4) 19

Ans:2

Sol: $f(x) = x^n + 1$

$\because f(3) = 3^n + 1 = 28$

$\Rightarrow n = 3$

$\therefore f(x) = x^3 + 1$

$\therefore f(4) = 65$

53. If x = -9 is a root of $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then the other two roots are:

(1) {3, 7} (2) {2, 7}

(3) {3, 6} (4) {2, 6}

Ans:2

Sol: $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0, \quad [R_1 \to R_1 + R_2 + R_3]$

$$\Rightarrow (x+9)\begin{vmatrix} 1 & 1 & 1 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$$

$$\Rightarrow (x+9)(x^2 - 9x + 14) = 0 \Rightarrow x = -9, 2, 7$$

54. The slope of tangent to the curve $y = \int_0^x \frac{dt}{1+t^3}$ at the point where x = 2, is

(1) $\frac{1}{9}$ (2) 9

(3) $\frac{1}{3}$ (4) 3

Ans: 1

Sol: $y = \int_0^x \frac{dt}{1+t^3} \Rightarrow \frac{dy}{dx} = \frac{1}{1+x^3}$

$$\therefore \left.\frac{dy}{dx}\right|_{x=2} = 1/9$$

55. If f(x), g(x) be differentiable functions and f(1) = g(1) = 2, then

$$\lim_{x\to 1} \frac{f(1)g(x) - f(x)g(1) - f(1) + g(1)}{g(x) - f(x)}$$,is

(1) 0 (2) 1

(3) 2 (4) -1

Ans:3

Sol: $\lim_{x\to 1} \frac{f(1)g'(x) - f'(x)g(1)}{g'(x) - f'(x)}$

$$= \lim_{x\to 1} \frac{2\{g'(x) - f'(x)\}}{g'(x) - f'(x)} = 2$$

56. If $y = 2\log\left|\left(\sqrt{e}.\sin x\right)\right|$; then $\frac{dy}{dx}$ is

(1) $2\cot x$ (2) $\frac{1}{2}\cot x$

(3) $\frac{1}{\sqrt{e}}\cot x$ (4) $\sqrt{e}\cot x$

Ans: 1

Sol: $y = 2\log\left(\sqrt{e}.\sin x\right)$

$$\therefore y = 2\log\sqrt{e} + 2\log\sin x$$

$$\frac{dy}{dx} = 2\frac{1}{\sin x}.\cos x = 2\cot x$$

57. $\lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{\sqrt{rn}}$ equals

(1) 2 (2) 1

(3) 0 (4) 4

Ans:1

Sol: Required $= \lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{\sqrt{n}} . \frac{1}{\sqrt{r}}$

$$= \lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{n} \frac{1}{\sqrt{\frac{r}{n}}} = \int_0^1 \frac{1}{\sqrt{x}} dx = \left[2\sqrt{x}\right]_0^1 = 2$$

58. If $\int_{\log 2}^{x} \frac{dx}{\sqrt{e^x - 1}} = \frac{\pi}{6}$, then x =

(1) 4 (2) $\log 8$

(3) $\log 4$ (4) $\log 2$

Ans:3

Sol: $\int_{\log 2}^{x} \frac{dx}{\sqrt{e^x - 1}} = \int_{\log 2}^{x} \frac{e^{x/2}}{e^{x/2}\sqrt{\left(e^{x/2}\right)^2 - 1}} dx$

put $e^{x/2} = z$

or $\frac{1}{2}e^{x/2}dx = dz$

$$\Rightarrow \int_{\log 2}^{x} \frac{dx}{\sqrt{e^x - 1}} = 2\int_{\sqrt{2}}^{e^{x/2}} \frac{dz}{|z|\sqrt{z^2 - 1}} = 2\left[\sec^{-1} z\right]_{\sqrt{2}}^{e^{x/2}}$$

$$\therefore 2\left\{\sec^{-1} e^{x/2} - \sec^{-1}\sqrt{2}\right\} = \pi/6$$

$$\Rightarrow \sec^{-1} e^{x/2} = \frac{\pi}{12} + \frac{\pi}{4} = \frac{\pi}{3}$$

$$\Rightarrow x = \log 4$$

59. The area bounded by the curve $y = \sqrt{4 - x^2}$ and the line y = 0 is

(1) 4π (2) 2π

(3) π (4) $\pi/2$

Ans: 2

Sol: $y = \sqrt{4 - x^2} \Rightarrow$ a semi-circle so area $= \frac{\pi(2)^2}{2} = 2\pi$

60. A spherical balloon is pumped, at the constant rate of $3m^3$/min. The rate of increase of its surface area at certain instant is found to be $5m^2$/min. At this instant its radius equals;

(1) $\frac{1}{5}m$ (2) $\frac{3}{5}m$

(3) $\frac{6}{5}m$ (4) $\frac{2}{5}m$

Ans:3

Sol: $V=\frac{4}{3}\pi r^3 \Rightarrow \frac{dV}{dt}=4\pi r^2\frac{dr}{dt}$

Also $S=4\pi r^2 \Rightarrow \frac{ds}{dt}=8\pi r.\frac{dr}{dt}$

Where, $\frac{dV}{dt}=3,\frac{ds}{dt}=5$

$\therefore \frac{r}{2}=\frac{3}{5}\Rightarrow r=\frac{6}{5}m$

61. The roots of $x^2-ax+b=0$ differ by unity, then:

(1) $b^2=1+4a$ (2) $a^2=1+4b$

(3) $b^2+4a=1$ (4) $a^2+4b=1$

Ans: 2

Sol: Let x_1, x_2 be the roots, then

$|x_1-x_2|=1\Rightarrow (x_1+x_2)^2-4x_1x_2=1$

$\Rightarrow a^2-4b=1\Rightarrow a^2=1+4b$

62. A person while dialing a telephone number, forgets the last three digits of the number but remember that exactly two of them same. He dials the number randomly. The probability that he dials the correct number is

(1) $\frac{1}{135}$ (2) $\frac{1}{27}$

(3) $\frac{1}{54}$ (4) $\frac{1}{270}$

Ans: 4

Sol: Required probability $=\frac{1}{{}^{10}C_2.2.\frac{3!}{2!}}=\frac{1}{270}$

63. Sum of the series

$$\frac{1}{\sqrt{2}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{8}}+\frac{1}{\sqrt{8}+\sqrt{11}}+\frac{1}{\sqrt{11}+\sqrt{14}}+..$$

.....upto n terms equals

(1) $\frac{n}{\sqrt{3n+2}-\sqrt{2}}$ (2) $\frac{1}{3}\left(\sqrt{2}-\sqrt{3n+2}\right)$

(3) $\frac{n}{\sqrt{3n+2}+\sqrt{2}}$ (4) $\frac{n}{\sqrt{2}}$

Ans: 3

Sol: Required sum=

$$\frac{1}{3}\left[\sqrt{5}-\sqrt{2}+\sqrt{8}-\sqrt{5}+\sqrt{11}-\sqrt{8}+...+\sqrt{3n+2}-\sqrt{3n-1}\right]$$

$$=\frac{1}{3}\left[\sqrt{3n+2}-\sqrt{2}\right]=\frac{n}{\sqrt{3n+2}+\sqrt{2}}$$

64. The value of $\sin^{-1}\left(\cos\left(\sin^{-1}\frac{\sqrt{3}}{2}\right)\right)$

(1) 0 (2) $\pi/3$

(3) $\pi/6$ (4) $\pi/2$

Ans: 3

Sol: $\sin^{-1}\left(\cos\left(\sin^{-1}\frac{\sqrt{3}}{2}\right)\right)$

$$=\sin^{-1}\left(\cos\frac{\pi}{3}\right)=\sin^{-1}\left(\frac{1}{2}\right)=\frac{\pi}{6}$$

65. The number of solutions of the equation $5\sec\theta-13=12\tan\theta$ in $[0,2\pi]$

(1) 2 (2) 1

(3) 4 (4) 0

Ans:1

Sol: $\therefore 5\sec\theta=13+12\tan\theta$

$\Rightarrow 13\cos\theta+12\sin\theta=5$

or

$$\frac{13}{\sqrt{13^2+12^2}}\cos\theta+\frac{12}{\sqrt{13^2+12^2}}\sin\theta=\frac{5}{\sqrt{13^2+12^2}}$$

$\theta=2n\pi\pm\cos^{-1}\frac{5}{\sqrt{313}}+\cos^{-1}\frac{13}{\sqrt{313}}$, $n\in Z$

or $\cos(\theta-\alpha)=\frac{5}{\sqrt{313}}$ where $\cos\alpha=\frac{13}{\sqrt{313}}$

As $\cos^{-1}\frac{5}{\sqrt{313}}>\cos^{-1}\frac{13}{\sqrt{313}}$, we get

$\theta\in[0,2\pi]$, when n =0 (one value, taking positive sign) and when n =1 (one value, taking negative sign)

66. The equation:

$\left|\sqrt{(x-2)^2+(y-1)^2}-\sqrt{(x+2)^2+y^2}\right|=c$, will represent a hyperbola if

(1) $c\in(0,6)$ (2) $c\in(0,5)$

(3) $c\in\left(0,\sqrt{17}\right)$ (4) $c\in\phi$

Ans:3

Sol: Let $S_1\equiv(2,1)$, $S_2(-2,0)$ and P(x, y)

$\therefore$ gives expression becomes:

$|PS_1-PS_2|=c$, P will lie on hyperbola if

$c<S_1S_2\Rightarrow 0<c<\sqrt{17}$

67. If the lines x + 2y + 3 = 0, 3y -2x+5 = 0 and x - 5y +a = 0 are concurrent, then:

(1) a = -2 (2) a = -8

(3) a = -1 (4) a = 1

Ans:2

Sol: Concurrent lines $\begin{vmatrix}1&2&3\\-2&3&5\\1&-5&a\end{vmatrix}=0$

$\Rightarrow 3a+25-2(-2a-5)+3(10-3)=0$

$\Rightarrow 7a+25+10+21=0\Rightarrow a=-8$

68. Which of following expression is meaning less

(1) $\vec{a}\times(\vec{b}\times\vec{c})$ (2) $\vec{a}.(\vec{b}\times\vec{c})$

(3) $\vec{a}.(\vec{b}.\vec{c})$ (4) $(\vec{a}\times\vec{b}).\vec{c}$

Ans:3

Sol: Basic concept

69. The square of length of tangent from (3, -4) on the circle $x^2+y^2-4x-6y+3=0$

(1) 20 (2) 30

(3) 40 (4) 50

Ans: 3

Sol: Length of tangent $=\sqrt{3^2+(-4)^2-4(3)-6(-4)+3}$

$=\sqrt{40}$ hence 40

70. If $A=\begin{bmatrix}1&-2&-3\\2&1&-2\\3&2&1\end{bmatrix}$, then A is

(1) A symmetric matrix

(2) A skew-symmetric matrix

(3) A singular matrix

(4) Non-singular matrix

Ans:4

Sol: It is clear that A is neither symmetric nor skew-symmetric.

and $|A|=1(1+4)+2(2+6)-3(4-3)=18$

Hence A is non-singular

71. The number of diagonals of a polygon of 20 sides is

(1) 25 (2) 150

(3) 170 (4) 210

Ans:3

Sol:Required number of diagonals $={}^{20}C_2-20=170$

72. $\int_0^{\pi/2}\frac{dx}{1+\tan x}$ equals to

(1) 0 (2) π

(3) $\frac{\pi}{2}$ (4) $\frac{\pi}{4}$

Ans: 4

Sol: $I=\int_0^{\pi/2}\frac{dx}{1+\tan x}$ .....(1)

$\therefore I=\int_0^{\pi/2}\frac{dx}{1+\cot x}\Rightarrow I=\int_0^{\pi/2}\frac{\tan x}{1+\tan x}dx$ .....(2)

(1) + (2) $\Rightarrow 2I=\int_0^{\pi/2}dx=\frac{\pi}{2}\Rightarrow I=\frac{\pi}{4}$

73. $\lim_{x\to0^+}(1+x)^{\cot x}$ equals

(1) e (2) e^{-1}

(3) e^2 (4) e^{-2}

Ans: 1

Sol: $\lim_{x\to0^+}(1+x)^{\cot x}=\lim_{h\to0}\left((1+h)^{\frac{1}{h}}\right)^{h.\cot h}$

$e^{\lim_{h\to0}\frac{h}{\tan h}}=e$

74. Orthogonal trajectories of family of hyperbolas $xy = c^2$, is $c \neq 0$

(1) $x^2 - y^2 + a = 0$ (2) $x(y - x) = a$

(3) $x^2 + y^2 = a$ (4) $y(x - y) = a$

Ans: 1

Sol: $\because xy = c^2$

$$x\frac{dy}{dx} + y = 0$$

Differential equation for orthogonal trajectory is

$$-x\frac{dx}{dy} + y = 0$$

$$\Rightarrow ydy - xdx = 0$$

$$\therefore \frac{y^2}{2} - \frac{x^2}{2} = b \text{ (b is arbitary constant)}$$

$$\Rightarrow y^2 - x^2 = 2b$$

$$\Rightarrow x^2 - y^2 + a = 0; \{\text{Let } 2b = a\}$$

75. The remainder obtained when $1! + 2! + 3! + \ldots + 95!$ is divided by 15, is

(1) 3 (2) 14

(3) 1 (4) 2

Ans:1

Sol: Required remainder is same as the remainder obtained when $(1! + 2! + 3! + 4!)$ is divided by 15 i.e (1+ 2+ 6 + 24) divided by 15 i.e 3.

76. $\lim\limits_{x\to\infty}\left(\sqrt{x+\sqrt{x}} - \sqrt{x}\right)$ equals

(1) 1 (2) 0

(3) $\frac{1}{2}$ (4) 2

Ans: 3

Sol: $\lim\limits_{x\to\infty}\left(\sqrt{x+\sqrt{x}} - \sqrt{x}\right) = \lim\limits_{x\to\infty}\frac{\sqrt{x}}{\sqrt{x+\sqrt{x}} + \sqrt{x}}$

$$= \lim_{x\to\infty}\frac{1}{\left(\sqrt{1+\frac{1}{\sqrt{x}}} + 1\right)} = \frac{1}{2}$$

77. $\int e^x(\cos x - \sin x)dx$ is equal to

(1) $e^x \cos x + c$ (2) $e^x \sin x + c$

(3) $-e^x \cos x + c$ (4) $-e^x \sin x + c$

Ans: 1

Sol: $\int e^x(\cos x - \sin x)dx$

$$= \int e^x \cos x dx - \int e^x \sin x dx$$

$$= e^x \cos x + \int e^x \sin x dx - \int e^x \sin x dx + c$$

$$= e^x \cos x + c$$

78. For any arbitrary vector $\vec{a}$, the expression:

$(\vec{a}.\hat{i})(\vec{a}\times\hat{i}) + (\vec{a}.\hat{j})(\vec{a}\times\hat{j}) + (\vec{a}.\hat{k})(\vec{a}\times\hat{k})$ is equal to

(1) $\vec{a}$ (2) $2\vec{a}$

(3) $3\vec{a}$ (4) $\vec{0}$

Ans:4

Sol: Let $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$

$\therefore \vec{a}.\hat{i} = a_1$ $\quad \vec{a}\times\hat{i} = -a_2\hat{k} + a_3\hat{j}$

$\therefore \vec{a}.\hat{j} = a_2$ $\quad \vec{a}\times\hat{j} = +a_1\hat{k} - a_3\hat{i}$

$\therefore \vec{a}.\hat{k} = a_3$ $\quad \vec{a}\times\hat{k} = -a_1\hat{j} + a_2\hat{i}$

required value $= \vec{0}$

79. The solution of differential equation $(xy + x + y + 1)dy = dx$, equal to

(1) $y(y+1) - 2\log|x+1| = c$

(2) $(y+1)^2 + 2\log|x+1| = c$

(3) $(y+1)^2 - 2\log|x+1| = c$

(4) $y(y+1) + 2\log|x+1| = c$

Ans: 3

Sol: $(xy + x + y + 1)dy = dx$

$$\Rightarrow (x+1)(y+1)dy = dx$$

$$\Rightarrow (y+1)dy = \frac{dx}{x+1}$$

on integrating both sides

$$\Rightarrow \frac{y^2}{2} + y = \log|x+1| + k$$

$$\Rightarrow (y+1)^2 = 2\log|x+1| + c$$

80. Let $\vec{a},\vec{b},\vec{c}$ be pairwise mutually perpendicular vectors, such that; $|\vec{a}|=1,|\vec{b}|=2,|\vec{c}|=2$ then $|\vec{a}+\vec{b}+\vec{c}|$ equals

(1) 2 (2) 4
(3) 3 (4) 6

Ans:3

Sol: $|\vec{a}+\vec{b}+\vec{c}|=\sqrt{|a|^2+|b|^2+|c|^2}=\sqrt{1+4+4}=3$

81. Select the **incorrect** match w.r.t interspecific interaction.

Species A	Species B	Interaction
(1) –		– Competition
(2) –		O Amensalism
(3) +		O Predation
(4) +		+ Protocooperation

Ans : 3

82. Select **wrongly** matched pair.

(1) Down's syndrome – Mongolism
(2) Monosomy – Patau syndrome
(3) 47, XXY – Klinefelter syndrome
(4) 45, XO – Turner syndrome

Ans : 2

83. The annual net primary productivity of whole biosphere is _____, with contribution of terrestrial ecosystem is approximately _____.

(1) 170 billion tons, 55%
(2) 170 billion tons, 68%
(3) 115 billion tons, 33%
(4) 170 million tons, 70%

Ans : 2

84. After culturing the anther of a plant, a few diploid plants were found alongwith haploid plants. The diploid plants could have developed from

(1) Generative cell of pollen
(2) Cells of anther wall
(3) Vegetative cell of pollen
(4) Exine of pollen wall

Ans : 2

85. How many statements are **correct** from the list given below?

(a) "EcoSan" toilets are used in area of Kerala and Sri Lanka.
(b) Water (prevention and control of pollution) Act, 1974.
(c) National forest policy (1988) of India has recommended 67% forest cover for plains.
(d) The concept of Joint Forest Management (JFM) introduced by Government of India in 1971.

(1) (a), (b) & (d) (2) (a) & (c)
(3) Only (a) & (b) (4) (a), (b), (c) & (d)

Ans : 3

86. Match the Column I and Column II.

Column I	**Column II**
a. Germplasm collection	(i) Crucial and require scientific evaluation
b. Cross-hybridisation purelines	(ii) Generating
c. Parents evaluation and selection	(iii) Back-bone of plant breeding
d. Superior and tedious testing	(iv) Time consuming recombinants selection and

(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(iv), c(ii), d(i)
(3) a(iv), b(iii), c(i), d(ii) (4) a(iv), b(iii), c(ii), d(i)

Ans : 2

87. Plant body is diploid, the gametangia are also diploid but the gametes produced in gametangia are haploid in :

(1) Fucus and Sargassum
(2) Ulothrix and Spirogyra
(3) Chlorella and Scenedesmus
(4) None of the above

Ans : 1

88. 250 g of microorganism like *Methylophilus methylotrophus* produce 25 tonnes of protein per day. This is because of

(1) High quality of protein present in them
(2) High rate of biomass production
(3) Culturing bacteria in specialised nutrient medium
(4) Enriches soil with nitrogen fixation

Ans : 2

89. Match the column I with column II

Column I	Column II
a. Glyoxysome	(i) Plant lysosomes
b. Sphaerosome	(ii) Glyoxylate cycle
c. Mitochondria	(iii) Photorespiration
d. Peroxisome	(iv) Succinate dehydrogenase

(1) a(ii), b(i), c(iv), d(iii)
(2) a(ii), b(i), c(iii), d(iv)
(3) a(iii), b(i), c(iv), d(ii)
(4) a(i), b(ii), c(iv), d(iii)

Ans : 1

90. Choose the **incorrect** option w.r.t. blood grouping.

	Phenotype	Genotype	Possible cross
(1)	AB	$I^A I^B$	A × B
(2)	A	$I^A I^O$	A × AB
(3)	B	$I^B I^B$	A × AB
(4)	O	$I^O I^O$	A × A

Ans : 3

91. Which of the following is high energy molecule produced by oxidative decarboxylation in aerobic respiration but is neither the intermediate of TCA nor EMP?

(1) NADH $+H^+$ (2) ATP
(3) Acetyl CoA (4) Succinyl CoA

Ans : 3

92. 27 : 1 : 1 : 27 test cross ratio of Hutchinson cross for grain colour and size of endosperm in maize suggests that the distance between the linked genes is

(1) 3.6 cM (2) 96.4 cM
(3) 48.2 cM (4) 1.8 cM

Ans : 1

93. Tyloses thickenings are seen in

(1) Phloem cells
(2) Ray parenchyma only
(3) Collenchyma
(4) Ray parenchyma and xylem cells

Ans : 4

94. (a) Essential elements are components of energy related compounds
(b) Essential elements are components of structural elements of cells
(c) Mn^{2+} is an activator of alcohol dehydrogenase

(1) All are correct
(2) Only (a) is incorrect
(3) Only (b) is incorrect
(4) Only (c) is incorrect

Ans : 4

95. Which one is correct for life span?

(1) Fruitfly < Crow < Parrot
(2) Rice < Banana < Rose
(3) Banyan > Peepal > Mango
(4) Banyan > Rose > Banana

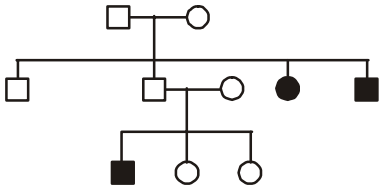
Ans : 1

96. OEC is located in/on

(1) Outer surface of granal membrane
(2) Lumen of stroma lamellae
(3) Inner surface of thylakoid membrane
(4) Stroma.

Ans : 3

97. Study the pedigree chart given below. What does it show?



(1) Both the parents are homozygous
(2) The trait under study could be phenylketonuria
(3) Inheritance of colourblindness
(4) It shows criss cross inheritance

Ans : 2

98. In a 4.7 kbp long piece of ds linear DNA the number of phosphodiester bonds will be

(1) 9400 (2) 4700
(3) 4698 (4) 9398

Ans : 4

99. If we study productivity, which of the following statement is **incorrect**?

(1) Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis
(2) The annual net primary productivity of the whole biosphere is approximately 170 billion tons

(3) Net primary productivity is the available biomass for the consumption to herbivores only

(4) Secondary productivity is the rate of formation of new organic matter by consumers

Ans : 3

100. Development of 10 male gametophytes containing male gametes from microspore mother cell, will require how many meiosis and mitosis respectively?

(1) 3 and 20 (2) 5 and 10

(3) 3 and 10 (4) 5 and 20

Ans : 1

101. Which of the following is **incorrect** w.r.t. male reproductive system of humans?

(1) Alkaline mucus from Cowper's glands is secreted as pre-seminal fluid into urethra before main ejaculation

(2) Cryptorchidism can be cured by estrogen therapy in the new borns

(3) Prostate gland is homologous to the Skene's glands of female vulva

(4) Smegma from glands of Tyson lubricates the glans penis but it can also harbour bacterial growth in it

Ans. 2

102. The loss of bone mineral density in post menopausal females can be attributed to reduction in blood titre of

(1) Calcitriol (2)Estradiol

(3) Gonadotropins (4)Progesterone

Ans. 2

103. Which of the following is/are sources of progesterone in a non pregnant female, causing peak level of progesterone concentration on day 21 of a 28 day menstrual cycle?

(a) Graafian follicle

(b) Theca cells of tertiary follicle

(c) Corpus luteum

(d) Hypothalamic hypophyseal system

(e) Secondary oocyte

(1) (a), (b) & (d) (2) (a), (b), (c) & (e)

(3) (c) only (4) (c) & (d) only

Ans. 3

104. The corpus luteum of pregnancy is generally larger in size than the corpus luteum of menstruation. Its maintenance for a time period longer than corpus luteum of menstruation is due to

(1) Excess LH secretion from pituitary after implantation

(2) Chorionic gonadotropin (hCG) secreted by trophoblast cells of developing embryo

(3) Chorionic leuteotropic hormone secreted from uterus wall after implantation

(4) Absence of negative feedback to pituitary from ovaries due to decreased estrogen and progesterone levels after implantation

Ans. 2

105. The operation of Hardy Weinberg equilibrium in a population indicates its tendency to remain in genetic equilibrium w.r.t. its gene pool. The equilibrium, however, may be disturbed by

(1) Random mating

(2) Absence of mutations

(3) Lack of natural selection

(4) Genetic drift

Ans. 4

106. Which of the following **correctly** represents the origin of mammals from primitive ancestral reptiles?

(1) Early reptiles → Sauropsids → Thecodonts → mammals

(2) Early reptiles → Sauropsids → Therapsids → mammals

(3) Early reptiles → Synapsids → Therapsids → mammals

(4) Early reptiles → Sauropsids → Pelycosaurs → mammals

Ans. 3

107. Which of the following are examples of convergent evolution?

(a) Mouth parts of housefly and mosquito

(b) Flippers of penguins and dolphins

(c) Sting of honey bee and scorpion

(1) Only (a) (2)(a) & (c)

(3) (b) & (c) (4)(a), (b) & (c)

Ans. 3

108. The type of natural selection in which more number of individuals acquire characteristics different from the mean character value at both ends of the distribution curve simultaneously is known as

(1) Directional selection as seen in peppered moth before industrialization

(2) Directional selection as seen in peppered moth after industrialization

(3) Disruptive selection as seen in ears of corn

(4) Balancing selection as seen in selection of heterozygotes in sickle cell anaemia

Ans. 3

109. In the test tube baby programme, the transfer of an early embryo with less than eight cells is done into __(A)__ and the technique is called __(B)__.

Choose the option that correctly fills the blanks (A) and (B)

(1) Uterus, intra uterine transfer (IUT)

(2) Uterus, embryo transfer (ET)

(3) Fallopian tube, zygotic intrafallopian transfer (ZIFT)

(4) Fallopian tube, embryo transfer (ET)

Ans. 3

110. Fusion of which parts of coxal bone develop cavity where femur articulates

(1) Ilium, ischium (2) Scapula, clavicle

(3) Ilium, ischium, pubis (4) Ischium, pubis

Ans. 3

111. Arthropods can be differentiated from annelids by

(1) Metameric segmentation

(2) Presence of nephridia

(3) Jointed appendages

(4) Presence of double ventral solid nerve cord

Ans. 3

112. After the occurrence of fertilization, the corpus luteum is rescued from involution by _____ hormone which is also detected in gravidex test for confirmation of implantation.

(1) Progesterone

(2) CRH (corticotropin releasing hormone)

(3) Luteinizing hormone

(4) hCG (human chorionic gonadotropin)

Ans. 4

113. What will be the consequence if conduction from atria to the ventricles is completely interrupted in human?

(1) Ventricles will stop beating leading to death

(2) Ventricles will beat at low rate independent of the atria

(3) Heart failure occurs that slowly shift to cardiac arrest

(4) Atrial impulses will be directed to ventricles through some other path

Ans. 2

114. All the following hormones mediate their major effect without actually entering the target cells, **except**

(1) Insulin (2) Growth hormone

(3) Glucagon (4) Mineralocorticoid

Ans. 4

115. Match the following

	Column I		**Column II**
a.	Loudness of sound is correlated with	(i)	Frequency of sound wave
b.	Pitch of sound is correlated with	(ii)	Amplitude of sound wave
c.	Accommodation luminescence	(iii)	Range of of eye to which human eye respond
d.	Adaptation of eye	(iv)	With respect to distance

(1) a(ii), b(i), c(iv), d(iii)

(2) a(i), b(ii), c(iii), d(iv)

(3) a(ii), b(i), c(iii), d(iv)

(4) a(i), b(ii), c(iv), d(iii)

Ans. 1

116. Choose the **correct** statement w.r.t the neuroglial cells

(1) They are exclusively ectodermal in origin

(2) They are excitable cells

(3) They constitute less than one half volume of neural tissue

(4) They protect and support neurons

Ans. 4

117. Parasympathetic system increase activity of

(1) Lacrimal gland, sweat gland, arrector pili

(2) Heart, lacrimal gland, pancreas

(3) Heart, adrenal gland, sweat gland

(4) Gut, urinary bladder, salivary glands

Ans. 4

118. In a menstrual cycle of 35 day duration, which of the following events is correctly matched with the time period of its occurrence?

(1) Rise in the level of progesterone - day 5 to 21

(2) Regeneration of endometrium - day 1 to 5

(3) Release of secondary oocyte - day 14

(4) Development of secretory endometrium - day 21 to 30

Ans. 4

119. 'During the seventh month of intra uterine development, the human embryo resembles a baby ape, being completely covered with hair and having proportionately longer forelimbs'.

The above statement provides support to

(1) Theory of inheritance of acquired characters given by Lamarck

(2) Recapitulation theory by Ernst Haeckel

(3) Kin selection theory of Hamilton

(4) Origin of apes from man like ancestors

Ans. 2

120. The various cell stages in spermatogenesis with the number(s) of chromosomes in each stage is given below:

(a) Spermatogonium type A – (44 + X + Y)

(b) Spermatogonium type B – (44 + X + Y)

(c) Primary spermatocyte – (22 + X) or (22 + Y)

(d) Secondary spermatocyte – (22 + X) or (22 + Y)

The option(s) which are not matched correctly is/ are

(1) (b) & (c) (2) (b), (c) & (d)

(3) (a) & (d) (4) Only (c)

Ans. 4