JIPMER MBBS ENTRANCE TEST 2018

EXAMINATION PAPER

(BASED ON MEMORY RETENTION)

Date : 03-06-2018 (Sunday) | Time : 03.00 pm - 05.30 pm | Evening Session

NOTE:-

1. Questions are collected from the appeared students.
2. The solutions are prepared by the expert faculty team of Resonance Pre-Medical division, Kota.
3. Questions may not be in the order or sequence as asked in the actual examination paper.
4. The questions collected may not have all the options similar to the actual paper. Students are advised to see the question and answer / solutions.
5. Actual JIPMER Paper has 200 questions but we have included only those many questions which have been collected from the students as per following table :-

Subject	No. of Question in Actual JIPMER Paper	No. of Question in this Paper
Chemistry	60	37
Physics	60	40
Biology	60	21
English & Comprehension + Logical & Quantitative Reasoning	20	00
Total	**200**	**98**

PART - A (CHEMISTRY)

1. If osmotic pressure of 5% (w/v) solution of sucrose is same as 3%(w/v) solution of 'X' find molecular mass of X.

(1) 570 (2) 205.2 (3) 342 (4) None

Ans. **(2)**

Sol. $i_1c_1 = i_2c_2$

$$\frac{5\times1000}{342\times100} = \frac{3}{M}\times\frac{1000}{100}$$

$$M = \frac{3}{5}\times342 = 205.2$$

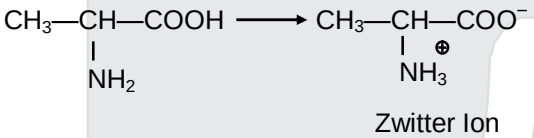
2. Which of following is zwitter ion

(1) Glycinehydrochloride (2) Nylon 6,6

(3) Alanine (4) None

Ans. **(3)**

Sol. Alanine



Zwitter Ion

3. Find pH of 0.1 M NaOH solution

(1) 1 (2) 2 (3) 13 (4) 17

Ans. **(3)**

Sol. 0.1 M NaOH give 0.1 M OH^-

pOH = 1 pH = 13

4. Find out products of hydrolysis of NaCl solution on cathode and anode

(1) H_2, Cl_2 (2) Cl_2, H_2 (3) Na, Cl_2 (4) Na, O_2

Ans. **(1)**

Sol. C : $H_2O \longrightarrow H_2 + 2OH^-$

A : $2Cl^- \longrightarrow Cl_2 + 2e^-$

5. Which pair can not act as buffer

(1) $CH_3COOH + CH_3COONa$ (2) Borax + H_3BO_3

(3) $HCl + NH_4OH$ (4) $NH_4Cl + HCl$

Ans. **(4)**

Sol. NH_4Cl and HCl can not behave as buffer

6. Which of the following is correct displacement reaction

(1) $AgNO_3 + Cu \longrightarrow Cu(NO_3)_2 + Ag$ (2) $Pb(NO_3)_2 + Cu \longrightarrow Cu(NO_3)_2 + Pb$

(3) $H_2 + ZnCl_2 \longrightarrow Zn + 2HCl$ (4) $Cu + 2HCl \longrightarrow CuCl_2 + H_2$

Ans. **(1)**

Sol. According to ECS Ag^+ can displace by Cu

7. $XeF_6 + xH_2O \longrightarrow$ products find x

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

Ans. **(2)**

Sol. $XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$

8. What is bond dissociate energy of HCl, $\Delta H_f(HCl) = -93$, B.E. $(H_2) = 434$, B.E. $(Cl_2) = 242$ (in KJ/mol)

(1) 532 KJ/mol (2) 431 KJ/mol (3) 332 KJ/mol (4) 232 KJ/mol

Ans. **(2)**

Sol. $\frac{1}{2}H_2 + \frac{1}{2}Cl_2 \longrightarrow HCl \quad \Delta H_f$

$\Delta H_f = \text{B.E.}H_2 \times \frac{1}{2} + \text{B.E.}Cl_2 \times \frac{1}{2} - \text{B.E. HCl}$

9. If activation energy of a reaction is zero and value of rate constant at 280 K is 1.6×10^5. Find its value at 300 K

(1) 1.6×10^5 (2) 3.2×10^5 (3) 0.8×10^5 (4) can not determine

Ans. **(1)**

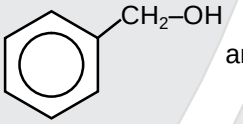
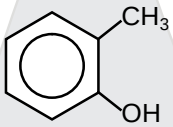
Sol. If $E_a = 0$ then K is constant

10. Which of the following is invert sugar

(1) Glucose (2) Fructose (3) Sucrose (4) Starch

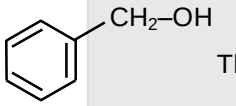
Ans. **(3)**

Sol. Sucrose is a disaccharide made by glucose and Fructose.

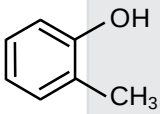
11. Find relation b/w  and 

(1) Functional Isomer (2) Tautomers (3) Chain Isomer (4) Metamers

Ans. **(1)**

Sol. 

This is a alcohol



This is a enol

Both have different chemical properties.

12. Which is suitable reagent for wurtz reaction :

(1) Na/ether (2) Na/alcohol (3) Zn/ether (4) Zn/alcohol

Ans. **(1)**

Sol. $R—X \xrightarrow[\text{ether}]{Na} R—R$ (Wurtz reaction)

13. Which of the following pair behaves strong and weak base hydride NH_3, PH_3, AsH_3, SbH_3, BiH_3

(1) NH_3, PH_3 (2) NH_3, BiH_3 (3) PH_3, BiH_3 (4) BiH_3, AsH_3

Ans. **(2)**

Sol. Basic nature : $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$

14. In an adiabatic expansion of gas from 1 atm, 300 K to 8 atm & "T" K. Find T if (γ = 3/2)

(1) 350 K (2) 150 K (3) 600 K (4) 400 K

Ans. **(3)**

Sol. $P_1^{1-y}T_1^y = P_2^{1-y}T_2^y$

$$\left(\frac{1}{8}\right)^{1-\frac{3}{2}} = \left(\frac{T_2}{300}\right)^{3/2}$$

$$\left(\frac{1}{8}\right)^{\frac{1}{2}\times\frac{2}{3}} = \frac{T_2}{300}$$

$2 \times 300 = T_2$

600 K

15. Which of the following becomes paramagnetic on heating

(1) MnO (2) Fe_3O_4 (3) $ZnFe_2O_4$ (4) (2) & (3) both

Ans. **(4)**

Sol. Ferrimagnetic change their nature on heating and become magnetic

eg. Fe_3O_4, $ZnFe_2O_4$, $MgFe_2O_4$

16. **Assertion :** Catalyst increase rate of reaction while photosensitizer initiate a reaction.

Reason : Catalyst decrease E_a but photosensitizer act as energy carrier

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans **(1)**

Sol. Both are correct and reason explain the assertion

17. Which is refining process for copper

(1) Bessimerization (2) Polling (3) Roasting (4) Smelting

Ans. **(2)**

Sol. Bessimerization $\rightarrow$ Self reduction in copper

Polling $\rightarrow$ refining process

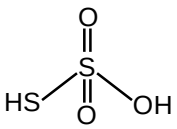
18. What is the formula of Marshalls acid

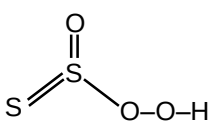
(1) $H_2S_2O_8$ (2) H_2SO_4 (3) $H_2S_2O_6$ (2) H_2SO_5

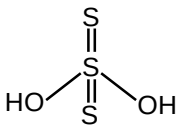
Ans. **(1)**

Sol. It is actually $H_2S_2O_8$

19. What is the structure of Thiosulphuric acid

(1) 

(2) 

(3) 

(4) None

Ans. **(3)**

20. Which of the following is diamagnetic O_2, S_2, N_2, C_2

(1) O_2, N_2 (2) O_2, S_2 (3) N_2, C_2 (4) S_2, C_2

Ans. **(3)**

Sol. O_2 and S_2 are paramagnetic according to MOT

21. Thiosulphuric acid is

(1) $H_2S_2O_3$ (2) H_2SO_4 (3) $H_2S_2O_7$ (4) H_2SO_5

Ans. **(1)**

Sol. Thiosulphuric acid : $H_2S_2O_3$

22. A 5 % solution of sucrose is isotonic with 3% solution of a solute find molecular weight of that solute ?

(1) 54 g (2) 108 g (3) 216 g (4) 65 g

Ans. **(2)**

Sol. 5% Glucose solution is isotonic with 3% of unknown solute

$\therefore$ conc. of glucose = conc. of solute

$$\frac{5}{180} = \frac{3}{M}$$

$$M = \frac{3 \times 180}{5} \text{ 108 g}$$

23. What is Marshall's acid ?

(1) $H_2S_2O_3$ (2) $H_2S_2O_7$ (3) H_2SO_4 (4) $H_2S_2O_8$

Ans. **(4)**

Sol. Marshall acid is $H_2O_2O_8$

24. Which of the following is most paramagnetic : V^{3+}, Fe^{2+}, V^{4+}, Ti^{2+}

(1) V^{3+} (2) Fe^{2+} (3) V^{4+} (4) Ti^{2+}

Ans. **(2)**

Sol. Valence configuration

V^{3+} : $3d^2$ no of unpaired e^- = 2

Fe^{2+} : $3d^6$ no of unpaired e^- = 4

V^{4+} : $3d^1$ no of unpaired e^- = 1

Ti^{2+} : $3d^2$ no of unpaired e^- = 2

$\therefore$ Fe^{2+} has maximum unpaired electrons

25. Element A & B have electronegativeties 3 & 1.2 respectively? Bond b/w them ?

(1) Purely covalent (2)Purely ionic (3) Polar covalent (4) None of these

Ans. **(3)**

Sol. ΔEN = 3.0 – 1.2 = 1.8 ; Bond will polar covalent bond

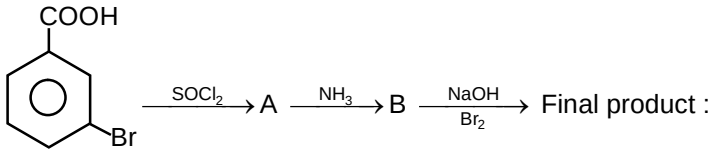
26. Which of the following are isomer :

(1) Acetone & Propanol (2) Acetone & Propanoic acid

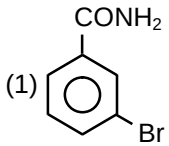
(3) Acetone & Propanal (4) Acetone & Cyclopropanone

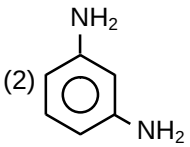
Ans. **(1)**

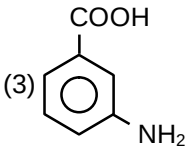
Sol. Acetone & Propanal have same molecular formula and different functional group.

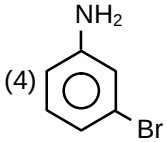
27. 

Final product will be :

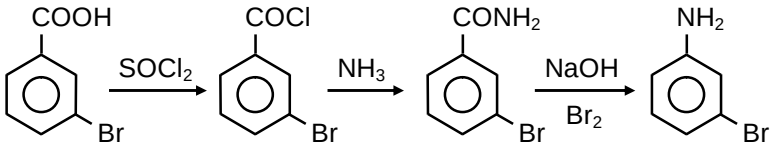
(1) 

(2) 

(3) 

(4) 

Ans. **(4)**

Sol. 

28. The amount of charge required in Faraday to get 40 g Al from almuna by electrolysis

(1) $\frac{50}{3}$ F (2) $\frac{40}{3}$ F (3) $\frac{40}{9}$ F (4) $\frac{50}{9}$ F

Ans. **(3)**

Sol. $Al^{3+} + 3e^- \rightarrow Al$

$\frac{n_e}{3} = n_{al}$

$\frac{Q}{3F} = \frac{40}{27} \Rightarrow Q = \frac{40F}{9} = 4.44\ F$

29. Oxidation number of Cr in $[Cr[NH_3]_4Cl_2]^+$

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

Ans. **(3)**

Sol. Oxidation number of Cr in $[Cr[NH_3]_4Cl_2]^+$ is +3

$x + (4\times0) + (-1\times2) = +1$

$x - 2 = +1$

$x = +3$

30. What is standard gibbs free energy of rxn

$Zn(s) + Cu^{2+} \longrightarrow Zn^{2+} + Cu(s)$

Given $E^\circ\ Zn^{2+}/Zn = -0.74$ & $E^\circ\ Cu^{2+}/Cu = 0.36$

(1) 300 kJ (2) 212.3 kJ (3) 200 kJ (4) 515 kJ

Ans. **(2)**

Sol. $E^\circ_{cell} = E^\circ_{red} = E^\circ_{oxid.}$

$= 0.36 + 0.74 = 1.10\ V$

$\Delta G^\circ = -nFE^\circ$

$= -2 \times 96500 \times 1.10\ J = 221.30\ kJ$

31. A gas acquires 24.6 l at 1 atm and 27ºC temperature. What volume it will occupy at 10 atm & 373ºC?

(1) 7.5 L (2) 10.2 L (3) 5.3 L (4) 15 L

Ans. **(3)**

Sol. Combined Gas Law :

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$\frac{1\times 24.6}{300} = \frac{10\times V}{646}$$

V = 5.2 L

32. Arrange order with respect to oxidation no. : SO_4^{2-} , $S_2O_4^{2-}$

(1) $SO_4^{2-} < S_2O_4^{2-}$ (2) $S_2O_4^{2-} = SO_4^{2-}$ (3) $SO_4^{2-} > S_2O_4^{2-}$ (4) None of these

Ans. **(3)**

Sol. Oxidation number os S in

SO_4^{2-} is =6

$S_2O_4^{2-}$ is +3

$SO_4^{2-} > S_2O_4^{2-}$ increasing order

33. Which can give strongest conjugate base

(i) HClO (ii) HCN (iii) HNO_2

(1) HOCl (2) HCN (3) HNO_2 (4) HNO_3

Ans. **(2)**

Sol. HCN is weakest acid, hence its conjugate bace CN^- is strongest

34. Solution with similar osmotic pressure are called ?

(i) Isotonic (ii) Azestrops (iii) Hypotonic

(1) Isotonic (2) Azeotrope (3) Hyptotonic (4) Hypertonic

Ans. **(1)**

Sol. Solution with same osmotic pressures are called isotonic

35. Which of following can act as both oxidizing and reducing agent

(i) SO_2 (ii) HNO_3 (iii) HNO_2

(1) SO_2, HNO_2 (2) HNO_3, HNO_2 (3) HNO_2, $HClO_4$ (4) $HClO_4$, SO_2

Ans. **(1)**

Sol. Oxidation number of

(i) S in SO_2 = +4

(ii) N in HNO_3 = 5 (max. value)

(iii) N in HNO_2 = +3

SO_2 and HNO_2 can act as oxidizing and reducing agents

36. 300 gm of 25% w/w solution of solute A is mixed with 400 gm of 40%(w/w) solution of another solute B. What is the w/w percentage of new mixture.

(1) 10.71 % in A (2) 35% in B (3) 25 % in A (4) 40 % in B

Ans. **(1)**

Sol. A : 300 g of 25% w/w

B : 400 g of 40% w/w

w/w % of A = $\frac{25\% \text{of } 300}{300+400} = \frac{75}{700} \times 100 = 10.71\%$

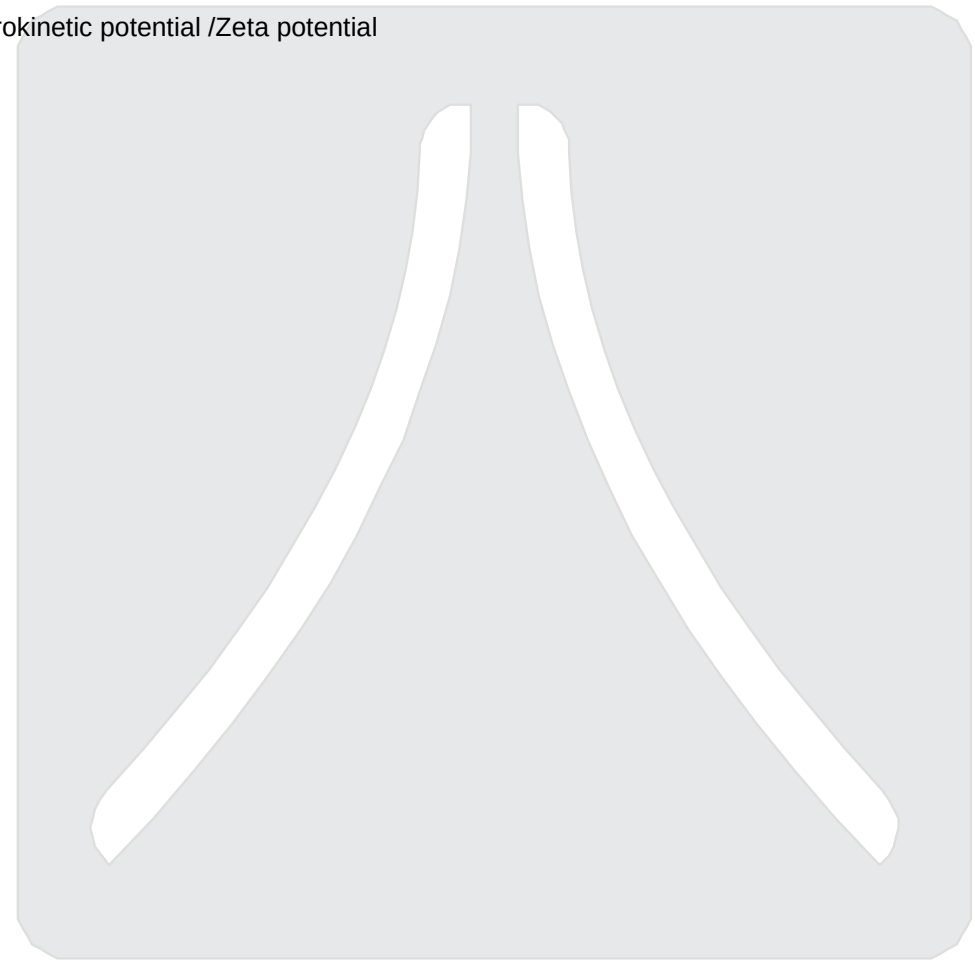
w/w % of B = $\frac{40\% \text{of } 400}{300+400} \times 100 = 22.85\%$

37. The potential difference b/w the fixed layer and the diffused layer of opposite charges in a collidol solution is called.

(1) Zeta potential (2) Avalanche voltage (3) Retarding potential (4) None of these

Ans. **(1)**

Sol. Electrokinetic potential /Zeta potential



PART - B (PHYSICS)

38. A current i is flowing through the wire of diameter d having drift velocity of electrons v_d in it. What will be new drift velocity when diameter of wire is made d/4?

(1) $4\ V_d$ (2) $\frac{V_d}{4}$ (3) $16\ V_d$ (4) $\frac{V_d}{16}$

Ans. **(3)**

Sol. $I = nAeV_d$

Now I is constant

$V_d \propto \frac{1}{A}$

If diameter of wire is $\frac{d}{4}$ than area is $\frac{1}{16}$ times so V_d new drift velocity = $16\ V_d$

39. How much intense is 80 dB sound in comparison to 40 dB?

(1) 10^4 (2) 10^2 (3) 2 (4) $\frac{1}{2}$

Ans. **(1)**

Sol. $B_1 = 10 \log_{10}\left(\frac{I_1}{I_0}\right)$ and $B_2 = 10 \log_{10}\left(\frac{I_2}{I_0}\right)$

$80 = 10 \log_{10}\left(\frac{I_1}{I_0}\right) \Rightarrow 40 = 10 \log_{10}\left(\frac{I_2}{I_0}\right)$

$10^8 = \left(\frac{I_1}{I_0}\right) \Rightarrow 10^4 = \frac{I_2}{I_0}$ so $\frac{I_1}{I_2} = \frac{10^8}{10^4} = 10^4$

40. Due to γ decay, what is the effect on neutron and proton numbers?

(1) Both remains constant

(2) Proton number increase but neutron number decreases

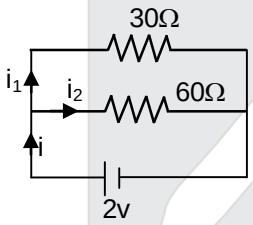
(3) Proton number decreases and neutron increases

(4) None of these

Ans. **(1)**

Sol. due to γ-decay there will be no effect on neutron and proton numbers.

41. Find I



(1) 0.1 Amp (2) 0.2 Amp (3) 0.3 Amp (4) 0.4 Amp

Ans. **(1)**

Sol. $I = \frac{V}{R_{eq}} = \frac{2}{20} = \frac{1}{10}\text{Amp} = 0.1\text{ Amp}$

42. Which of the following is incorrect

(1) n-p-n trasistor works as a diode

(2) The resistance of semiconductors decrease with ↑ increase in temperature.

(3) A p-type semiconductor is formed by dopping with trivalent impurities.

(4) major charge carriers in a n-type semiconductor are holes

Ans. **(4)**

Sol. Major charge carriers in n-type semiconductor are electrons not holes.

43. Pure silicon is

(1) conductor (2) insulator (3) semiconductors (4) None of these

Ans. **(3)**

Sol. Pure silicon is semiconductor

44. A force of 10 N acts on a body of mass 0.5 kg for 0.25 sec starting from rest. What is its momentum now ?

(1) 2.5 N/sec (2) 0.25 N/sec (3) 0.5 N/sec (4) 0.75 N/sec

Ans. **(1)**

Sol. $Ft = mV_2 - mV_1 \Rightarrow \quad 10 \times 0.25 = P_f - P_i$, $P_f = 2.5$

45. Which of the following is fusion?

(1) Gama decay (2) ${}_1^2H + {}_1^2H \longrightarrow {}_2^4He$ (3) Uranium decay (4) None of these

Ans. **(2)**

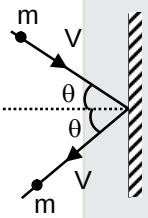
Sol. ${}_1^2H + {}_1^2H \rightarrow {}_2^4He$ is fusion process

46. A ball of 0.5 kg collided with wall at 30º and bounced back elastically. The speed of ball was 12 m/s. The contact remained for 1 sec. What is the force applied by wall on ball.

(1) $12\sqrt{3}$N (2) $6\sqrt{3}$N (3) $3\sqrt{3}$N (4) $\sqrt{3}$N

Ans. **(2)**

Sol. $F = \frac{\Delta P}{\Delta t}$



$F = \frac{2mV\cos\theta}{\Delta t}$

$F = \frac{2 \times 0.5 \times 12 \times \sqrt{3}}{2 \times 1}$

$F = 6\sqrt{3}$ Newton

47. A electron with kinetic energy k enters a region (i) uniform magnetic field (ii) non-uniform magnetic field and comes out with kinetic energy k_1 and k_2 respectively. What is relation between k_1, k_2 and k ?

(1) $K_1 > K_2 > K$ (2) $K_1 = K_2 > K$ (3) $K_1 = K_2 = K$ (4) $K_1 < K_2 < K$

Ans. **(3)**

Sol. Any type of magnetic filed can not change kinetic energy of charged particle. So

$K_1 = K_2 = K$

48. A e^- when accelerated by V volts experiences a force F when it enters a uniform magnetic field. What will the force experienced when it is accelerated by 2V volts.

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

Ans. **(4)**

Sol. $\frac{1}{2}mv^2 = qV$ so velocity $v \propto \sqrt{V}$

and force F = qvB

so $F \propto \sqrt{V}$

so now force $F = \sqrt{2}$ F

49. Kinetic energy of a particle is increased by 4 times. What will be the relation between initial and final momentum.

(1) $P_2 = 2P_1$ (2) $P_2 = \frac{P_1}{2}$ (3) $P_2 = P_1$ (4) $P_2 = 4P_1$

Ans. **(1)**

Sol. $P = \sqrt{2mK}$

So $\frac{P_1}{P_2} = \sqrt{\frac{K_1}{K_2}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$

So $P_2 = 2P_1$

Momentum will be doubled

50. What proves that light is a transverse wave?

(1) polarization (2) reflection (3) refraction (4) Interference

Ans. **(1)**

Sol. only transverse wave can show polarization. So polarization proves that light is transverse wave.

51. What is the maximum Reylonds number for laminar flow?

(1) 500 (2) 4000 (3) 2000 (4) 8000

Ans. **(3)**

Sol. If R < 2000 than flow will be laminar. So maximum Reynolds number = 2000

52. What is the range of a projectile thrown with velocity 98 m/sec with angle 30º from horizontal?

(1) $490\sqrt{3}$ meter (2) $980\sqrt{3}$ meter (3) $245\sqrt{3}$ meter (4) 100 meter

Ans. **(1)**

Sol. $R = \frac{u^2 \sin(2\theta)}{g} = \frac{98 \times 98 \times \sin(60)}{9.8} = 490\sqrt{3}$ meter

53. A pendulum bob is tilted 10º right to the vertical. Then comment on acceleration (direction) and velocity.

(1) Velocity is zero and acceleration is along length at string

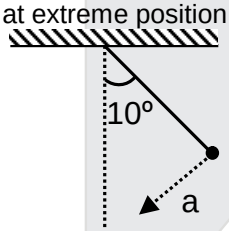
(2) Velocity and acceleration both are zero

(3) Velocity is zero and acceleration is perpendicular to string

(4) Velocity is along string and acceleration is perpendicular to string

Ans. **(3)**

Sol. at extreme position velocity is zero and acceleration will be tangential as shown.



54. For maximum range, the angle of projection should be

(1) 0º (2) 45º (3) 30º (4) 60º

Ans. **(2)**

Sol. $R = \frac{u^2 \sin(2\theta)}{g}$

For maximum range $2\theta = 90º$

$\theta = 45º$

55. If a object is thrown upward with 16m/s. Find time of flight?

(1) 1.6 sec (2) 4.8 sec (3) 3.2 sec (4) 1.2 sec

Ans. **(3)**

Sol. Time of flight

$T = \frac{2u}{g} = \frac{2 \times 16}{10} = 3.2 \text{sec}$

56. If the efficiency of an engine is 50% and its work output is 500 J. Find input ?
(1) 500 J (2) 100 J (3) 1000 J (4) 250 J

Ans. **(3)**

Sol. $\eta = \frac{\text{work out put}}{\text{heat input}}$

$\frac{1}{2} = \frac{500}{\text{Heat Input}}$

Heat Input = 1000

57. The efficiency of a heat engine is 1/6. Its efficiency double when the temperature of sink decreases by 62ºC, its efficiency doubles. Then what is the temperature of source ?
(1) 372 K (2) 470 K (3) 542 K (4) 1042 K

Ans. **(1)**

Sol. $\eta = 1 - \frac{T_2}{T_1}$

$\frac{1}{6} = 1 - \frac{T_2}{T_1}$ so $\frac{T_2}{T_1} = \frac{5}{6}$ so $T_2 = \frac{5T_1}{6}$

Now $\eta^1 = 1 - \frac{T_2^1}{T_1} \Rightarrow 2 \times \frac{1}{6} = 1 - \frac{(T_2 - 62)}{T_1} \Rightarrow \frac{T_2 - 62}{T_1} = \frac{2}{3}$

$3T_2 - 186 = 2T_1 \Rightarrow 3\left(\frac{5T_1}{6}\right) - 186 = 2T_1 \Rightarrow \frac{5}{2}T_1 - 2T_1 = 186$

$\frac{T_1}{2} = 186 \Rightarrow T_1 = 372$ K

58. The high and low points of a faulty thermometer are 95ºC and 5ºC. What is the actual temperature when that thermometer shows 62º C?
(1) 62 C (2) 63.33 C (3) 42 C (4) 72.3 C

Ans. **(2)**

Sol. $\frac{62-5}{95-5} = \frac{C-0}{100} = \frac{57}{90} = \frac{C}{100} \Rightarrow C = \frac{570}{9} = 63.33\,C$

59. $5\sin\frac{\pi}{2}(100t - 2x)$ what is time period?
(1) 0.02 sec (2) 0.04 sec (3) 0.06 sec (4) 0.01 sec

Ans. **(2)**

Sol. Y = 5 sin (50πt – πk)

Now w = 50π

So $T = \frac{2\pi}{w} = \frac{2\pi}{50\pi} = 0.04\,\text{sec}$

60. Comment on the K.E. and momentum of a satellite revolving in a circular orbit?
(1) Both constant (2) K.E. constant momentum is not constant
(3) K.E. is not constant momentum is constant (4) Both are not constant

Ans. **(2)**

Sol. When a satellite devolving in circular orbit its speed remains constant but velocity changes. So K.E. will remain constant while momentum will change.

61. What is difference between laser and normal light?
(1) Both lights are polarized
(2) Normal light is polarized but laser light is not
(3) Both light are not polarized
(4) Normal light is unpublicized but laser is polarized

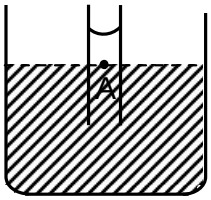
Ans. **(4)**

Sol. Laser light is polarized but normal light is not polarized.

62. Pressure at A

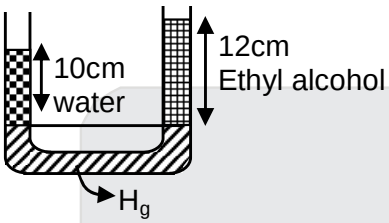
(1) P_0 (2) $P_0 - \frac{2T}{R}$ (3) $P_0 + \frac{2T}{R}$ (4) $P_0 - \frac{4T}{R}$

Ans. **(1)**



Sol. Pressure at A will be equal to atmospheric pressure P_0.

63. Find density of ethanol.



(1) $\frac{0.52\,gm}{cm^3}$ (2) $\frac{0.83\,gm}{cm^3}$ (3) $\frac{1.83\,gm}{cm^3}$ (4) $\frac{0.72\,gm}{cm^3}$

Ans. **(2)**

Sol. $P_0 + \rho_w g\,(10) = P_0 + \rho_{al}\, g\,(12)$

$\rho_w\, 10 = \rho_{al}\,(10)$

$$\rho_{al} = \frac{1\times 10}{12} = 0.83 gm/cm^3$$

64. A particle doing S.H.M. having amplitude 5 cm, mass 0.5 kg and angular frequency 5 is at 1 cm from mean position. Find potential energy and kinetic energy.

(1) K.E. = 150×10^{-3}J P.E. = 6.25×10^{-4} J (2) K.E. = 6.25×10^{-4}J P.E. = 150×10^{-3} J

(3) K.E. = 6.25×10^{-4}J P.E. = 6.25×10^{-4} J (4) K.E. = 150×10^{-3}J P.E. = 150×10^{-4} J

Ans. **(1)**

Sol. Potential energy

$$u = \frac{1}{2}mw^2x^2 = \frac{1}{2}\times 0.5\times 25\times(10^{-2})^2$$

$$= \frac{25}{4}\times 10^{-4}\text{ Joule} = 6.25 \times 10^{-4}\text{ Joule}$$

Kinetic energy

$$K = \frac{1}{2}mw^2(A^2 - x^2) = \frac{1}{2}0.5\times 25\,[25-1]\times 10^{-4}$$

$= 150 \times 10^{-4}$ Joule

65. A organ pipe open on both ends in the n^{th} harmonic is in resonance with a source of 1000 Hz. The length of pipe is 16.6 cm and speed of sound in air is 332 m/sec. Find the value of n.

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

Ans. **(1)**

Sol. $f = \frac{n.V}{2\ell}$

$1000 = \frac{n \times 332}{2 \times 16.6 \times 10^{-2}}$

$10 = \frac{n \times 332}{33.2}$

$n = 1$

66. $R = 65 \pm 1\ \Omega$

$\ell = 5 \pm 0.1$ mm

$d = 10 \pm 0.5$ mm

Find error in calculation of resistively

(1) 13% (2) 21% (3) 16% (4) 41%

Ans. **(1)**

Sol. $R = \frac{\rho\ell}{\pi(d/2)^2} \Rightarrow R = \frac{4\rho\ell}{\pi d^2} \Rightarrow \rho = \frac{\pi R d^2}{4\ell}$

$\frac{\Delta\rho}{\rho} = \frac{\Delta R}{R} + \frac{2\Delta d}{d} + \frac{\Delta\ell}{\ell} \Rightarrow \frac{\Delta\rho}{\rho} = \frac{1}{65} + \frac{2.(0.5)}{10} + \frac{0.1}{5}$

$\frac{\Delta\rho}{\rho} = 0.015 + 0.1 + 0.02 \Rightarrow \frac{\Delta\rho}{\rho} \approx 0.13$

So it is 13% error.

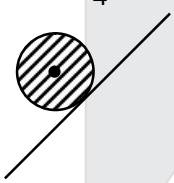
67. Find ratio of radius of gyration of a disc and ring of same radii at their tangential axis in plane.

(1) $\sqrt{\frac{5}{3}}$ (2) $\sqrt{\frac{5}{6}}$ (3) 1 (4) $\frac{2}{3}$

Ans. **(2)**

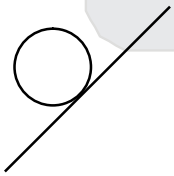
Sol. For disc

$MK_1^2 = \frac{5}{4}MR^2 \Rightarrow K_1 = \frac{\sqrt{5}}{2}R$



For Ring

$MK_2^2 = \frac{3}{2}MR^2 \Rightarrow K_2 = \sqrt{\frac{3}{2}}R$



So $\frac{k_1}{k_2} = \frac{\sqrt{5} \times \sqrt{2}}{2 \times \sqrt{3}} = \sqrt{\frac{5}{6}}$

68. A disc of moment of inertia 2 kg m^2 revolving with 8 radian/sec. is placed on another disc of moment of inertia 4 kg m^2 revolving 4 radian/sec. What is the angular frequency of composite disc?

(1) $\frac{16}{3}$Rad / sec (2) $\frac{16}{5}$Rad / sec (3) 4 Rad/sec (4) $\frac{3}{16}$Rad / sec

Ans. **(1)**

Sol. From angular momentum conservation

$I_1w_1 + I_2w_2 = (I_1 + I_2)w$

$2 \times 8 + 4 \times 4 = 6\ w$

$32 = 6w$

$w = \frac{32}{6} = \frac{16}{3}$rad / sec

69. What is the dimensional formula of dynamic viscosity?

(1) $[m^1L^1T^{-2}]$ (2) $[m^1L^1T^{-1}]$ (3) $[m^1L^{-1}T^{-1}]$ (4) $[m^1L^1T^1]$

Ans. **(3)**

Sol. Dynamic viscosity $\mu = \tau.\frac{dy}{dc}$ τ = shearing stress $\frac{dy}{dc}$ = velocity gradient

$m = [m^1L^{-1}T^{-2}]\ [T^1] = [m^1L^{-1}T^{-1}]$

same coefficient of viscosity.

70. The force of attraction between two charges 8μC and –4μC is 0.2 N. Find the distance of separation.

(1) 12 meter (2) 1.2 meter (3) 120 meter (4) 0.12 meter

Ans. **(2)**

Sol. $F = \frac{K\ q_1q_2}{r^2}$

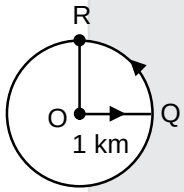
$0.2 = \frac{9\times10^9\times8\times10^{-6}\times4\times10^{-6}}{r^2}$

$r^2 = \frac{9\times8\times4}{0.2}\times10^{-3}$

$r^2 = \frac{9\times8\times4}{2}\times10^{-2}$

$r = 12 \times 10^{-1}$ meter = 1.2 m

71. A runner starts from O and goes to O following path OQRO In 1 hr. What is net displacement and average speed?



(1) 0, 0 km/hr (2) 0, 3.57 km/hr (3) 0, 2.57 km/hr (4) 0, 1 km/hr

Ans. **(2)**

Sol. Net displacement is zero.

Average speed = $\frac{\text{Total distance}}{\text{Total time}} = \frac{1\,\text{km} + \frac{\pi R}{2} + 1\,\text{km}}{1\,\text{hr}}$ = 3.57 km/hr

72. In a LC circuit. Angular frequency at resonance is w. What will be the new angular frequency when inductor's inductance is made 2 times and capacitance is made 4 times?

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

Ans. **(2)**

Sol. $w = \frac{1}{\sqrt{LC}}$

Now if $L^1 = 2L$ $C^1 = 4C$

$w^1 = \frac{1}{\sqrt{2L.\ 4C}}$

$w^1 = \frac{1}{2\sqrt{2}} . \frac{1}{\sqrt{LC}} = \frac{w}{2\sqrt{2}}$

73. In a circuit $L = 10^{-3}$ H, $C = 10^{-3}$F. Find angular frequency.

(1) 1000 rad/sec (2) 100 rad/sec (3) 10 rad/sec (4) 10^{-3} rad/sec

Ans. **(1)**

Sol. $w = \frac{1}{\sqrt{LC}}$

$w = \frac{1}{\sqrt{10^{-3} \times 10^{-3}}} = 1000 \text{ rad / sec}$

74. If a boy of mass 50 kg is sitting on a car accelerating with acceleration 0.5 g on road. Then what is force applied by seat?

(1) 125 N (2) 250 N (3) 500 N (4) 175 N

Ans. **(2)**

Sol. F = ma

F = 50 × (0.5) g

= 25 g = 250 Newton.

75. e^- revolving with speed V is producing magnetic field B at centre. Find relation between radius of path, B & V?

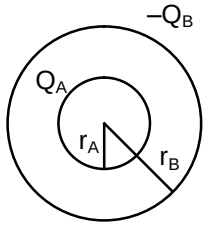
(1) $B \propto V \propto \frac{1}{r}$ (2) $B \propto V \propto \frac{1}{r^2}$ (3) $B \propto V^2 \propto \frac{1}{r}$ (4) $B \propto V^2 \propto \frac{1}{r^2}$

Sol. Magnetic field at center

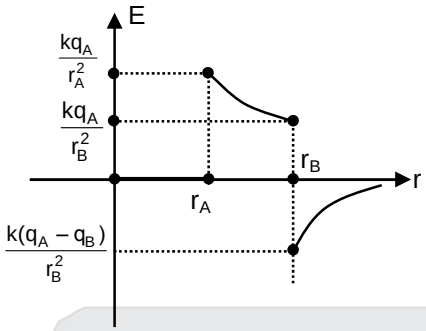
$B = \frac{\mu_0 I}{2r}$ where $I = \frac{e}{T}$, $I = \frac{eV}{2\pi r}$

$B = \frac{\mu_0}{2r} . \frac{eV}{2\pi r}$ $B = \frac{\mu_0 eV}{4\pi r^2}$

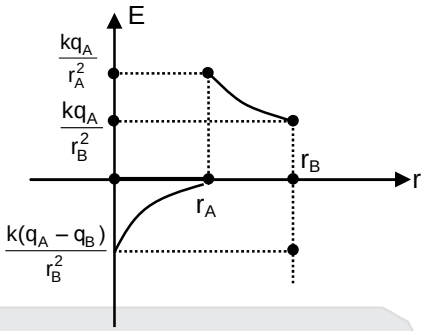
76. $|Q_B| > |Q_A|$ $r_B > r_A$ Q-draw graph of rotational verses distance from centre to outside?



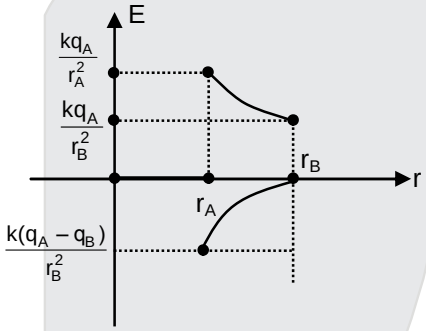
(1)



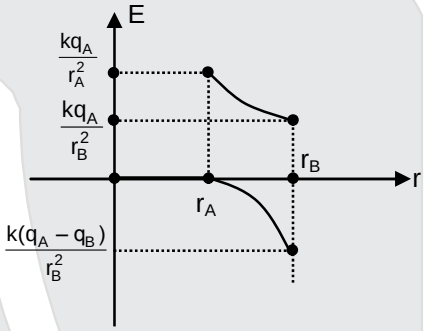
(2)



(3)

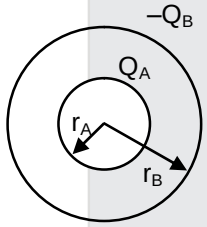


(4)



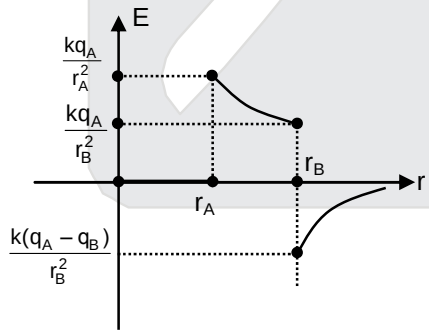
Ans. **(1)**

Sol. Let is find the electric field at a distance r from the center.

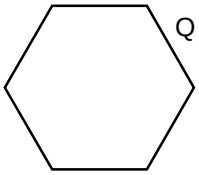


(i) If $r < r_A$; $E = 0$ (ii) If $r_A < r < r_B$; $E = \frac{kq_A}{r^2}$ (iii) If $r > r_B$; $E = \frac{k(q_A - q_B)}{r^2}$

So



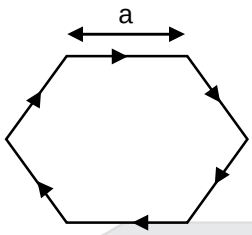
77. A regular hexagon of side a. A wire of length 24 a is coiled on that hexagon. If current in hexagon is I then find the magnetic moment.



(1) $3\sqrt{3}\,Ia^2$ (2) $6\sqrt{3}\,Ia^2$ (3) $\frac{3\sqrt{3}}{2}Ia^2$ (4) $6\,Ia^2$

Ans. **(2)**

Sol. Let number of turns = n



n × 6a = 24a

n = 4

Now magnetic moment M = nIA = 4.I.A

Now Area of hexagon $\frac{1}{2}a^2\sin(120)+a.\,2a\sin 60+\frac{1}{2}a^2\sin(120)$

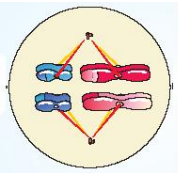
$=\frac{\sqrt{3}\,a^2}{4}+\sqrt{3}a^2+\frac{\sqrt{3}\,a^2}{4}=\frac{6\sqrt{3}\,a^2}{4}=\frac{3\sqrt{3}\,a^2}{2}$

So magnetic moment $=4.I.\left(\frac{3\sqrt{3}\,a^2}{2}\right)=6\sqrt{3}\;Ia^2$

PART – C : (BIOLOGY)

78. Rouleaux Formation is related to which of the cell/tissue:
(1) RBC (2) WBC (3) Platelets (4) Monocytes
Ans. **(1)**

79. Which is the 21st Amino acid
(1) Pyrrolysine (2) Selenocysteine (3) Cystine (4) Histidine
Ans. **(2)**

80. 
Above diagram represents
(1) Metaphase-I (2) Anaphase-I (3) Metaphase-II (4) Anaphase-II
Ans. **(1)**

81. Heterotrichous thallus is shown by which organism
(1) Chlamydomonas (2) Ectocarpus (3) Spirogyra (4) Volvax
Ans. **(2)**

82. Where is sacculus rotundus located?
(1) Between duodenum & jejunum (2) Between Ileum & Caecum
(3) Caecum and colon (4) Colon and rectum
Ans. **(2)**

83. Brunner's gland is located in
(1) Duodenum (2) Jejunum (3) Ileum (4) Stomach
Ans. **(1)**

84. Fimbrae are associated with which organ?
(1) Fallopian tube (2) Uterus (3) Vagina (4) Ovary
Ans. **(1)**

85. What is common between a Eukaryotic & Prokaryotic flagella?
(1) same structure (2) Both are used for locomotion
(3) Composed of same proteins (4) Both are extension of cell membrane
Ans. **(2)**

86. Which of the following is not a plant growth inhibitor
(1) Dormin (2) IAA (3) Ethylene (4) ABA
Ans. **(2)**

87. What is the R.Q. of glucose?
(1) One (2) Less than one (3) More than one (4) Infinite
Ans. **(1)**

88. 5 Glucose molecules aerobically respired and another 5 anaerobically. What will be the total no, of ATP and CO_2 evolved?
(1) 180 and 10 respectively (2) 10 and 180 respectively
(3) 36 and 2 respectively (4) 2 and 36 respectively
Ans. **(1)**

89. What is the symmetry of medusa
(1) Bilateral (2) Radial (3) Asymmetrical (4) Biradial
Ans. **(2)**

90. Perianth is found in which family :
(1) Cruciferae (2) Solonaceae (3) Laliaceae (4) Malvaceae
Ans. **(3)**

91. To which of the following repressor protein is attached
(1) operator (2) Inducer (3) Promoter (4) Structural gene
Ans. **(1)**

92. Which of the following can be used to convert ssDNA to dsDNA
(1) Terminal transferase (2) Eco R I
(3) Hind II (4) Reverse Transcriptase
Ans. **(1)**
Sol. **Terminal transferase is template independent DNA polymerase**

93. XYY $\rightarrow$ composition
(1) Super female (2) Hermaphrodite (3) Male (4) Supermale
Ans. **(4)**

94. Which of the following is involved in passive immunity
(1) Ig A (2) Ig E (3) Ig M (4) Ig E
Ans. **(1)**

95. Eye spot is seen in
(1) Chlamydomonas (2) Ulothrix (3) Spirogyra (4) Polysiphonia
Ans. **(1)**

96. What is incorrect about inhibin?
(1) It is a lipoprotein (2) Decreases FSH secretion
(3) Molecular weight is between 10k-30k Dalton (4) Secreted by sertoli cells
Ans. **(1)**

97. Which of the following pituitary hormone works indirectly?
(1) MSH (2) TSH (3) GH (4) Oxytocin
Ans. **(2)**

98. Arrange the following in descending order of volume: plasma, interstitial fluid, intracellular fluid.
(1) Intracellular → Interstitial → Plasma (2) Interstitial → Intracellular → Plasma
(3) Plasma → Interstitial → Intracellular (4) Intracellular → Plasma → Interstitial
Ans. **(1)**
Sol. Volume of body fluids in a person of 70 kg weight will be 42 liter, out of which intracellular fluid will be 28 Liter, volume of interstitial fluid will be 11 Liter and plasma volume will be 3 Liter.