BYJU'S JEE Mains Sample Paper 2018

Time Duration: 3 Hours

Maximum Marks: 360

Topics Covered:

Physics	**:Full Syllabus**
Chemistry	**:Full Syllabus**
Mathematics	**:Full Syllabus**

Important Instruction:

1. Attempting all the questions are compulsory.
2. Use **Blue / Black Ball** point pen only.
3. There are three sections of equal weightage in the question paper A, B, C (**Physics, Chemistry and Mathematics**) Having 30 questions each.
4. For marking scheme, +4 marks for each correct answer and -1 marks for each incorrect answer.
5. Use of calculator and other electronic devices is not allowed during the exam.
6. No extra sheets will be provided for any kind of work.

Name of the Student: ………………………………………………………………………………………….. Class: ……………………………………………

Rough Space

Father's Name:
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PART – A (PHYSICS)

1. A point source of light of power 'P' and wavelength 'λ' is emitting light in all directions. The number of photons present in a spherical region of radius 'r' to radius '2r' with centre at source, is

(a) $\frac{P\lambda}{4\pi r^2 hc}$ (b) $\frac{P\lambda r}{hc^2}$ (c) $\frac{P\lambda}{4\pi rhc^2}$ (d) $\frac{P\lambda r}{2hc^2}$

2. A bead moves outwards with constant speed 'u' along the spoke of a wheel and wheel rotating about its axis with constant angular velocity 'ω'. The bead leaves the centre of the wheel at t = 0. The velocity of the bead as a function of time is given by (where $\hat{e}_r$ and $\hat{e}_t$ are unit vectors along radial and tangential directions, respectively)

(a) $-u\hat{e}_r$ (b) $u\hat{e}_r + (ut\omega)\hat{e}_t$ (c) $u\hat{e}_r + u\omega\hat{e}_t$ (d) $ut\omega\hat{e}_t$

.

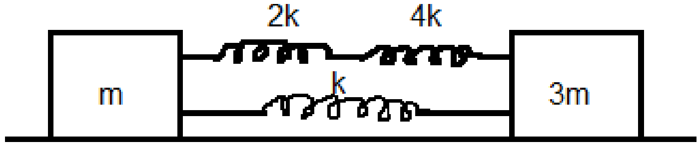
3. In a series LR growth circuit, the maximum current and maximum induced emf in an inductor of 6 mHare 3A and 8V respectively. In how much time the current in the circuit grows to 63.2% of its final value?

(a) $\frac{9}{4}$ms (b) $\frac{4}{9}$ms (c) 16 ms (d) $\frac{1}{10}$ms

4. A particle moves in a straight line with retardation proportional to square of its displacement. Its loss of kinetic energy for any displacement 'x' is proportional to

(a) x^2 (b) x^3 (c) $\log_e x$ (d) e^x

5. For the system shown in the given figure, the surface on which the blocks are placed is smooth. If the two
blocks are displaced by small amount, then determine the time period of oscillation of resulting motion of two
blocks.



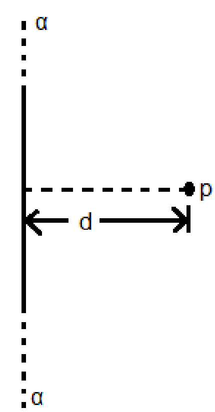
(a) $2\pi\sqrt{\frac{3m}{7k}}$ (b) $2\pi\sqrt{\frac{7m}{2k}}$ (c) $3\pi\sqrt{\frac{m}{7k}}$ (d) $2\pi\sqrt{\frac{3m}{4k}}$

6. A spherical shell of inner radius 'R_1' and outer radius 'R_2' is having variable thermal conductivity given by K =
$(a_0T)r$ where a_0 is constant, 'T' is temperature in Kelvin and 'r' is the distance from the centre. Two surfaces of
shell are maintained at temperature T_1 (inner surface) and T_2 (outer surface), respectively ($T_1 > T_2$). The heat
current flowing through the shell would be

(a) $\frac{4\pi a_0(T_1^2 - T_2^2) \times R_1R_2}{R_2 - R_1}$ (b) $\frac{4\pi a_0(T_1 - T_2)R_1R_2}{R_2 - R_1}$

(c) $\frac{4\pi a_0 R_1^2 R_2^2(T_1^2 - T_2^2)}{R_2^2 - R_1^2}$ (d) $\frac{4\pi a_0(T_1^2 - T_2^2)(R_1 + R_2)^2}{R_2 - R_1}$

7. A uniformly charged infinite long wire carries linear charge density 'λ'. The electric
potential at point 'p' is



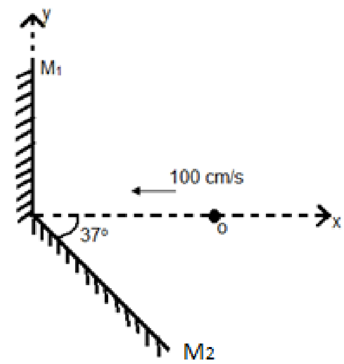
(a) $\frac{\lambda}{4\pi\varepsilon_0}$ (b) $\frac{\lambda}{2\pi\varepsilon_0}$

(c) $\frac{\lambda}{\pi\varepsilon_0}$ (d) Can't be found

8. Two particles of masses 3kg and 2kg are moving the velocities $\vec{V}_1 = 2\hat{i}$ and $\vec{V}_2 = 3\hat{j}$, respectively. The first
particle of mass 3kg has an acceleration of $\vec{a}_1 = 2\hat{i} + 2\hat{j}$ while acceleration of the second

particle is zero. The
centre of mass of these two particles follow a
(a) Parabolic path (b) Circular path (c) Straight line path (d) Elliptical path

9. Two plane mirrors are placed as shown in the figure below:



A point object is approaching the intersection point of mirrors with a
speed of 100 cm/s. The velocity of the image of object formed by M_2
w.r.to velocity of image of object formed by M_1, is

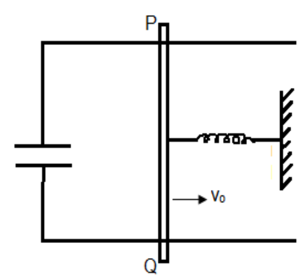
(a) $-128\hat{i} + 48\hat{j}$ (cm/s) (b) $-28\hat{i} + 48\hat{j}$ (cm/s)

(c) $128\hat{i} - 48\hat{j}$ (cm/s) (d) $100\hat{i} - 48\hat{j}$ (cm/s)

10. A satellite in a circular orbit around the earth has kinetic energy E_k. Minimum amount of energy that has to be
given to satellite so that it escapes from the earth's gravitational influence, is

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

11. A conducting rod PQ of mass 'm' and of length 'ℓ' is placed on two long
parallel(smooth and conducting) rails connected to a capacitor as shown
below. The rod PQ is connected to a non-conducting spring constant 'k',
which is initially in relaxed state. The entire arrangement is placed in a
magnetic field perpendicular to the plane of figure.
Neglect the resistance of rails and rod. Now, the rod is imparted a velocity
v_0 towards right, then acceleration of the rod as a function of its
displacement 'x' is given by.



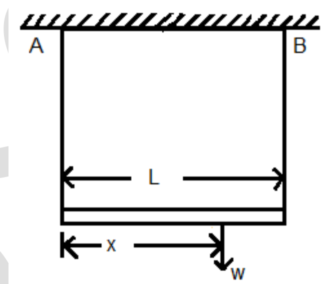
(a) $\frac{kx}{m}$ (b) $\frac{kx}{m + B^2\ell^2 c}$

(c) $\frac{kx}{m - B^2\ell^2 c}$ (d) None of these

12. Two travelling waves y_1 = A sin [K(x + ct)] and y_2 = A sin[K(x – ct)] are superposed on a string. The distance between the adjacent nodes will be

(a) $\frac{ct}{\pi}$ (b) $\frac{ct}{2\pi}$ (c) $\frac{\pi}{2k}$ (d) $\frac{\pi}{k}$

13. A light rod of length 'L' is suspended from a support horizontally by means of two vertical wires A and B of equal length as shown. Cross-section area of 'A' is half that of B. A weight 'w' is hung on the rod as shown. The value of 'x' so that the stress in 'A' is same as that in 'B', is



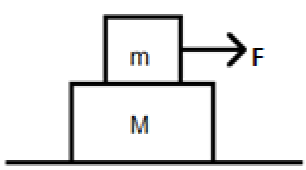
(a) $\frac{L}{3}$ (b) $\frac{L}{2}$

(c) $\frac{2L}{3}$ (d) $\frac{3L}{4}$

14. Two concentric spheres of radii r_1 and r_2 carry charges q_1 and q_2 respectively. If the surface charge density (σ) is the same for both the spheres, the electric potential at the common centre will be

(a) $\frac{\sigma}{\varepsilon_0}\times\frac{r_1}{r_2}$ (b) $\frac{\sigma}{\varepsilon_0}\times\frac{r_2}{r_1}$ (c) $\frac{\sigma}{\varepsilon_0}(r_1 - r_2)$ (d) $\frac{\sigma}{\varepsilon_0}(r_1 + r_2)$

15. The coefficient of static friction between the two blocks shown in the figure is 'μ' and the table is smooth. The maximum value of 'F' so that both blocks moves together, is



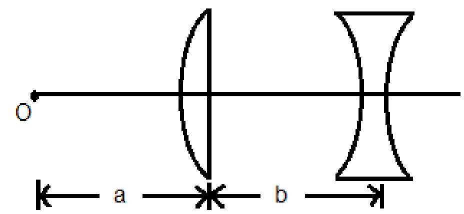
(a) μ(M + m)g (b) μmg

(c) μMg (d) $\frac{\mu m(M + m)g}{M}$

16. If de-Broglie wavelength of an electron in the nth Bohr orbit is λ_n and angular momentum is J_n, then

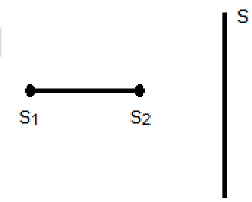
(a) $\lambda_n \propto J_n$ (b) $\lambda_n \propto \frac{1}{J_n}$ (c) $\lambda_n \propto J_n^2$ (d) $\lambda_n \propto \sqrt{J_n}$

17. A plano convex lens $\left(\mu = \frac{3}{2}\right)$ has radius of curvature R = 10 cm,
and is placed at a distance of 'b' from a concave lens of focal length 20 cm as shown in the figure.
At what distance 'a' should a point object be placed from plano
convex lens, so that position of the final image is independent of 'b'?



(a) 40 cm (b) 60 cm
(c) 30 cm (d) 20 cm

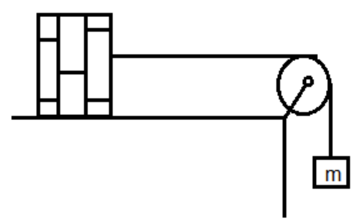
18. Two coherent sources S_1 and S_2 are situated on the x-axis, screen 'S' is in y –z
plane(as shown). The shape of the fringe on the screen is



(a) straight line (b) elliptical

(c) circular (d) rectangular

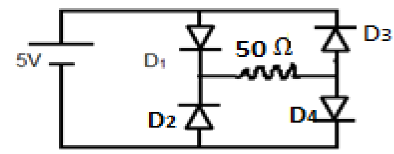
19. A transverse wave is passing through a light string shown in the figure.
The equation of wave is y = Asin(ωt – kx). The area of cross section of string
is 'A' and density is 'ρ'. The hanging mass is:



(a) Aω (b) $\frac{\omega}{kg}$
(c) $\frac{\rho A \omega^2}{k^2 g}$ (d) $\frac{\rho\omega}{kg}$

20. A beam of light is incident on a glass plate at an angle of incidence 60°. The reflected ray is polarized. The angle of refraction when the angle of incidence is 45° is
(a) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (b) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (c) $\sin^{-1}\left(\frac{1}{\sqrt{6}}\right)$ (d) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

21. Four silicon diodes are connected as shown in the figure. Assume the diodes Ω
to be ideal. The current through the resistor 'R' is



(a) 0.2 A (b) 0.1 A

(c) 0.3 A (d) 0.5 A

22. Two radioactive materials A1 and A2 have decay constants of 10λ0 and λ0. If initially they have same number
of nuclei, the ratio of number of their decayed nuclei will be $\left(\frac{1}{e}\right)$after a time

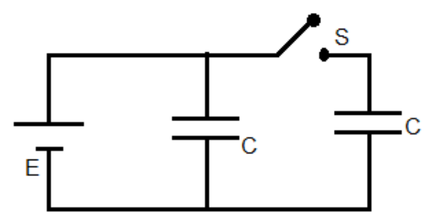
(a) $\frac{1}{\lambda_0}$ (b) $\frac{1}{9\lambda_0}$ (c)$\frac{1}{10\lambda_0}$ (d) 1

23. α and β particles emitted when uranium nucleus ${}_{92}U^{238}$ decays to ${}_{82}Pb^{214}$ are

(a) 6 – α particles and 2 – β particles (b) 4 – α particles and 2 – β particles

(c) 2 – α particles and 6 – β particles (d) 2 – α particles and 4 – β particles

24. Figure shows two identical parallel plate capacitors connected to a
battery. The switch is now opened and the free space between the
plates of capacitors is filled with a dielectric of k = 3. The ratio of the
total electrostatic energy stored in both the capacitors before and after the introduction of the dielectric is



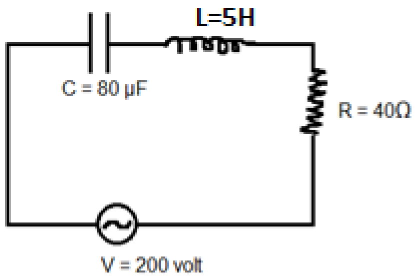
(a) $\frac{3}{4}$ (b) $\frac{4}{5}$ (c)$\frac{2}{3}$ (d) $\frac{3}{5}$

25. Two electric bulbs rated P_1 watt – V volt and P_2 watt – V volt are connected in parallel and V volt are applied

to it. The total power will be

(a) $\frac{P_1P_2}{P_1+P_2}$ (b) $\sqrt{P_1P_2}$ Watt (c) $(P_1 + P_2)$Watt (d) $\frac{P_1+P_2}{P_1P_2}$ Watt

26. From figure shown below a series L – C – R circuit connected to a variable frequency 200 V source. L = 5H, C = 80μF and R = 40Ω. Then the source frequency which drive the circuit at resonance is



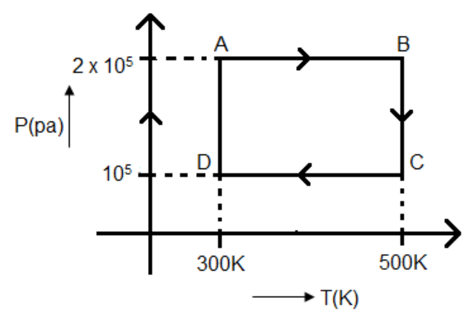
(a) 25 Hz (b) $\frac{25}{\pi}$ Hz

(c) 50 Hz (d) $\frac{50}{\pi}$ Hz

27. A magnet is moving towards the coil along the axis and the emf induced in the coil is 'e'. If the coil also starts
moving towards the magnet with the same speed, the induced emf will be

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

28. Two moles of helium gas are taken over the cycle ABCDA, as
shown in the P – T diagram
Assuming the gas to be ideal the work done 'W' on the gas in
taking it from A to B is



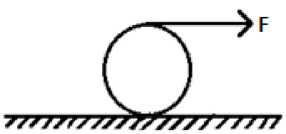
(a) 300 R (b) 400 R

(c) 500 R (d) 200 R

29. The potential energy of a particle of mass ‘m’ is given by U = $\frac{1}{2}kx^2$ for x < 0 and U = 0 for x ≥ 0. If total
mechanical energy of the particle is E. Then its speed for positive value of ‘x’ is

(a) zero (b) $\sqrt{\frac{2E}{m}}$ (c) $\sqrt{\frac{E}{m}}$ (d) $\sqrt{\frac{E}{2m}}$

30. A ring of mass ‘m’ and radius ‘R’ rolls on a horizontal rough surface without slipping due to an applied force ‘F’. The friction force acting on the ring is



(a) $\frac{F}{3}$ (b) $\frac{2F}{3}$ (c) $\frac{F}{4}$ (d) zero

PART – B
(CHEMISTRY)

31. 1g of the Ag salt of an organic dibasic acid yields, on strong heating, 0.5934 g of silver. If the weight % of
carbon in it is 8 times the weight % of hydrogen and half the weight percentage of oxygen, determine the
molecular formula of the acid [Awt of Ag = 108]

(a) $C_4H_6O_4$ (b) $C_4H_6O_6$ (c) $C_2H_6O_2$ (d) $C_5H_{10}O_5$

32. For a d – electron the orbital angular momentum is

(a) $\sqrt{6}\, h/2\pi$ (b) $\frac{\sqrt{2}h}{2\pi}$ (c) h/2π (d) 2h/ π

33. The correct order of ionic radius.

(a) $Na^+ > F^{-1} > Mg^{2+} > O^{2-} > Al^{3+}$
(b) $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$
(c) $Al^{3+} > Mg^{2+} > Na^+ > F^- > O^{2-}$
(d) $Na^+ > Mg^{2+} > Al^{3+} > O^{2-} > F^-$

34. Incorrect matching amongst the following is

(i) linear→ H_2O, SO_2 (ii)v – shaped → : $CH_2, SnCl_2$

(iii) see – saw shaped → $SF_4, TeCl_4$ (iv) T – shaped → ICl_3, ClF_3

(a) Only (i) (b) both (i) & (ii) (c) Only (iii) (d) both (iii) & (iv)

35. Which of the following is paramagnetic?

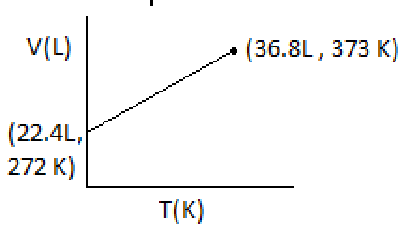
(a) CN^- (b) NO^+ (c) CO (d) O_2^-

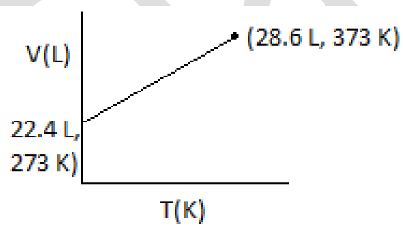
36. The volume of 10 N & 4N HCI required to make 1 L of 7 N HCL are

(a) 0.5 L of 10 N HCI and 0.5 L of 4N HCI (b) 0.6L of 10 N HCI of 0.4 L of 4N HCI

(c) 0.8 L of 10 N HCI & 0.2 L of 4 N HCI (d) 0.75 L of 10 N HCI of 0.25 L of 4N HCI

37. Which of the following V – T plots represents the behavior of one mole of an ideal gas at one atmosphere?

(a)


(b)


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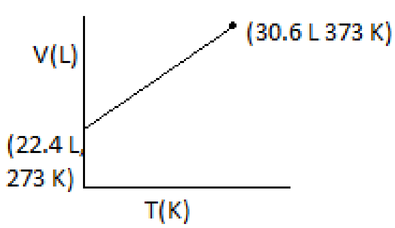
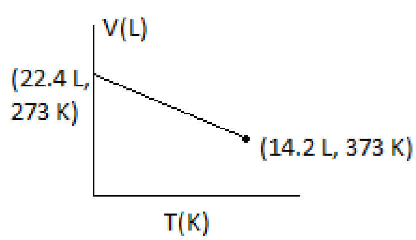


(d)


38. The reaction A to B is not feasible but on changing entropy through a easier of steps:

A ⟶ C ⟶ D ⟶ B

$$\Delta s\ (A \longrightarrow C) = 50\ eV$$
$$\Delta s\ (C \longrightarrow D) = 30\ eV$$
$$\Delta s\ (B \longrightarrow D) = 20\ eV$$

The entropy change for A ⟶ B would be

(a) 100 eV (b) 60 eV (c) – 60 eV (d) – 100 eV

39. The pH of the solution obtained by mixing 100 ml of a solution of pH = 3 with 400 mL of a solution of pH = 4 is

(a) 3 – log 2.8 (b) 7 – log 2.8 (c) 4 – log 2.8 (d) 5 – log 2.8

40. The equilibrium constant (K_p) for the decomposition of a gaseous water:

$H_2O(g) \rightleftharpoons H_2(g) + O_2(g)$

Is related to degree of dissociation at total pressure 'p' is given by

(a) $K_P = \frac{\propto^3 P^{1/2}}{(1+\propto)(2+\propto)^{1/2}}$ (b) $\frac{\propto^3 P^{3/2}}{(1+\propto)(2+\propto)^{1/2}} = K_P$

(c) $K_P = \frac{\propto^{3/2} P^2}{(1+\propto)(2+\propto)^{1/2}}$ (d) $K_P = \frac{\propto^{3/2} P^{1/2}}{(1-\propto)(2+\propto)^{1/2}}$

41. $aK_2Cr_2O_7 + bKCl + c\,H_2SO_4 \rightarrow$

x Cr $O_2Cl_2 + y\,KHSO_4 + z\,H_2O$

(a) a = 2 b = 4 c = 6 of x = 2 y = 6 z = 3
(b) a = 2 b = 2 c = 6 of x = 2 y = 2 z = 3
(c) a = 6 b = 4 c = 2 of x = 6 y = 3 z = 2
(d) a = 1 b = 4 c = 6 of x = 2 y = 6 z= 3

42. Very pure hydrogen (99.9%) can be made by which of the following processes?

(a) Mixing natural hydrocarbons of high molecular weight. (b) Electrolysis of water
(c) Reaction of salt like hydrides with water (d) Reaction of methane with steam.

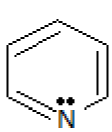
43. Among the following, the least thermally stable is

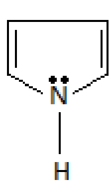
(a) K_2CO_3 (b) Na_2CO_3 (c) $BaCO_3$ (d) Li_2CO_3

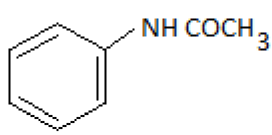
44. Boron cannot form which one of the following anions?

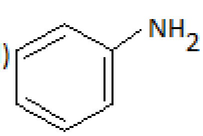
(a) BF_6^{3-} (b) BH_4^- (c) $B(OH)_4^-$ (d) BO_2^-

45. Which one of the following has the most nucleophlic nitrogen ?

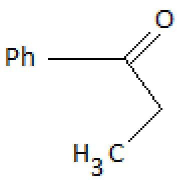
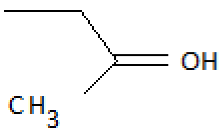
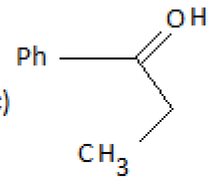
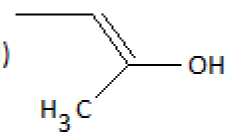
(a) 

(b) 

(c) 

(d) 

46. Ph C≡ $\mathrm{C-\ CH_3} \xrightarrow{\mathrm{Hg^{2+},H^{+}}} \mathrm{A}$

(a)  (b)  (c)  (d) 

47. If Ag I crystallize in zinc blende structure with I^- ions at lattice points, what fraction of tetrahedral voids is
occupied by Ag^+ ions?
(a) 25% (b) 50% (c) 100% (d) 75%

48. The F .pt$(\mathrm{in}\ ^\circ\mathrm{C})$ of a solution containing 0.1 g of $K_3[Fe(CN)_6](mol\ wt = 329)$ in 100 g of water $(kf = 1.86\ Kkg/\ mol)$ is
(a) – 2.3× 10^{-2} (b) – 5.7× 10^{-2} (c) – 5.7 × 10^{-3} (d) – 1.2 × 10^{-2}

49. The equivalent conductance of M/32 sol^n of a weak monobasic acid is 8 mho cm^2 and at infinite dilution is
400 mho cm^2. The dissociation constant of this acid is
(a) 1.25 × 10^{-6} (b) 6.25 × 10^{-4} (c) 1.25 × 10^{-4} (d) 1.25 × 10^{-5}

50. The rate of a reaction is given by rate r = K $[H^+]^n$ if the rate becomes 100 times when the pH changes from 2
to 1, the order of the reaction is
(a) 0 (b) 1 (c) 2 (d) 3

51. According to Freundlich adsorption isotherm, which of the following is correct?

(a) $\frac{x}{m} \propto p^1$ (b) $\frac{x}{m} \propto p^{1/n}$

(c) $\frac{x}{m} \propto p^0$ (d) All the above are correct for different ranges of pressure

52. Oxidation states of the metal in the minerals hematite and magnetite, respectively are.
(a) II, III hematite and III in magnetite (b) II, III in hematite and II, III in magnetite

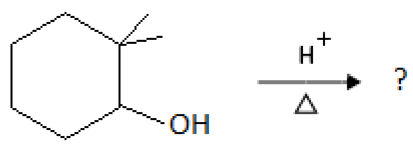
(c) II in hematite and II, III is magnetite (d) III in hematite and II & III in magnetite

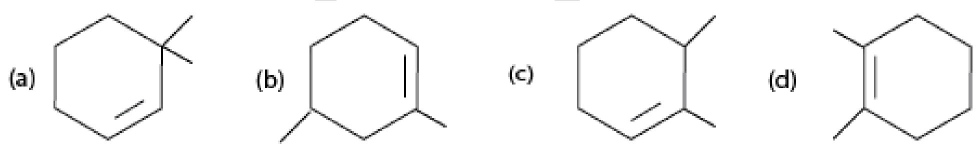
53. When Br_2 is treated with aqsol^n of NaF, NaCl&NaIresperately.
(a) F_2, Cl_2& I_2 are liberated (b) only F_2& Cl_2 are liberated
(c) Only I_2 is liberated (d) only Cl_2 is liberated

54. The orange solid on heating gives a colourless gas and a green solid which can be reduced to metal by
aluminium powder . Then the orange and the green solids are resp.
(a) $(NH_4)_2Cr_2O_7$ & Cr_2O_3 (b) $Na_2Cr_2O_7$& Cr_2O_3 (c) $K_2Cr_2O_7$& CrO_3 (d) $(NH_4)_2CrO_4$& CrO_3

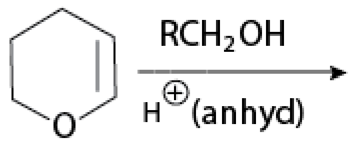
55. The complex [Pt(Py)(NH_3)BrCl] will have how many geometrical isomers?
(a) 3 (b) 4 (c) 0 (d) 2

56. Find the product of the given reaction





57. The major product of the following reaction is

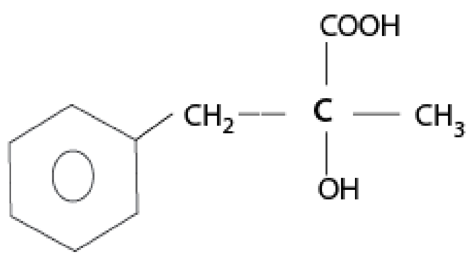


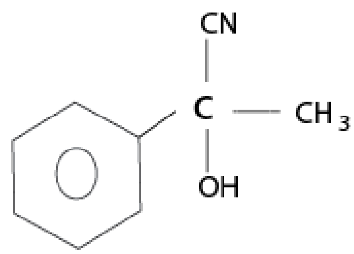
(a) Hemiacetal (b)anacetal (c) an ether (d) an ester

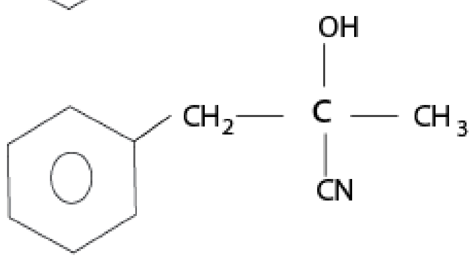
58. In a set of reaction acetic acid generates product D

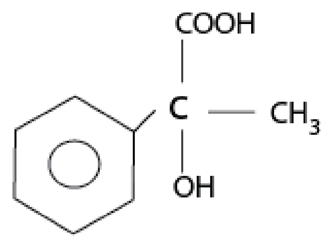
$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[\text{Anhy } AlCl_3]{\text{Bengene}} B \xrightarrow{HCN} C \xrightarrow{HOH} D$

The structure of D would be

(a) 

(b) 

(c) 

(d) 

59. Which one of the following gives amine on heating with amide?
(a) Br_2 in aq KOH (b) Br_2 in alc KOH (c) Cl_2 in sodium (d) sodium in ether

60. Which one is not a constituent of nucleic acid (a) Uracil (b) Guanidine (c) Phosphoric acid d) Ribose Sugar

PART – C
(MATHS)

61. OPQR is a square and M, N are the middle points of the sides PQ and QR respectively, then the ratio of the areas of the square and the triangle OMN is
(a) 4 : 1 (b) 8 : 3 (c) 2 : 1 (d) 4 : 3

62. If the tangent at the point P on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the line $5x - 2y + 6 = 0$ at a point Q on the y-axis, then length of PQ = _______
(a) 4 (b) $5\sqrt{5}$ (c) 5 (d) $4\sqrt{5}$

63. The angle between the tangents drawn from the point (1, 4) to the parabola $y^2 = 4x$ is
(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

64. Mean of 100 items is 49. It was discovered that three items which should have been 60, 70, 80 were
wrongly read as 40, 20, 50 respectively. Correct mean will be
(a) 48 (b) $82\frac{1}{2}$ (c) 50 (d) 80

65. Angle between asymptotes of the hyperbola $3x^2 - y^2 = 3$ is
(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{3\pi}{4}$

66. p→ (q ∨ r) is false, then the true valves of p, q , r respectively are
(a) T, T, F (b) T, F, T (c) F, T, T (d) F, F, T

67. $\underset{x\to 0}{\mathrm{Lt}} \frac{1-\cos^3 x}{\sin 3x \sin 5x} =$

(a) $\frac{1}{15}$ (b) $\frac{2}{15}$ (c) $\frac{1}{30}$ (d) $\frac{1}{10}$

68. $\mathrm{Sin}^{-1}x + \mathrm{Sin}^{-1}y = \pi/2$ then $\frac{dy}{dx} =$

(a) – x/y (b) – y/x (c) x/y (d) y/x

69. The tangent at A (2, 4) on $y = x^3 - 2x^2 + 4$ cuts the x axis at T then AT =
(a) $4\sqrt{17}$ (b) $\sqrt{17}/4$ (c) $\sqrt{17}$ (d) 17

70. The value of 'a' for which the function $f(x) = a \sin x + \frac{1}{3} \sin 3x$ has an extremum at $x = \pi/3$ is
(a) 2 (b) –2 (c) 2/3 (d) –2/3

71. The quadratic equation $3ax^2 + 2bx + c = 0$ has at least one root between 0 and 1 if
(a) a + b + c = 1 (b) a + b + c = 0 (c) 3a + 2ab + c = 0 (d) 6a + 2b = 0

72. $\int e^x \left(\frac{x^2+5x+7}{(x+3)^2}\right)dx = e^x f(x) + c$ then f(x) =

(a) $\frac{1}{x+3}$ (b) $-\frac{1}{x+3}$ (c) $-\left(\frac{x+2}{x+3}\right)$ (d) $\frac{x+2}{x+3}$

73. $\int_{-\pi/2}^{\pi/2} \ln\left(\frac{2-\sin x}{2+\sin x}\right) dx =$ ______

(a) $-\pi\log 2$ (b) $-\frac{\pi}{2}\log 2$ (c) $\frac{\pi}{2}\log 2$ (d) 0

74. The area enclosed by the curves y = |sin x|, x axis and |x| = π is (in sq units)
(a) 4 (b) 2 (c) 8 (d) 3/2

75. $xdy - ydx = \sqrt{x^2 - y^2}\,dx$ and y(1) = 0 then $y(e^{\pi/2}) =$

(a) π/2 (b) $e^{\pi/2}$ (c) 1 (d) e

76. If the angle between $\bar{a} = \lambda\hat{i} - 3\hat{j} - k$, $\bar{b} = 2\lambda\hat{i} + \lambda\hat{j} - k$, is acute and $\bar{b}$ makes obtuse angle with the axes of
its coordinates, then λ∈ ______
(a) (–∞, 0) (b) $\left(-\infty, \frac{1}{2}\right)$ (c) $\left(-\infty, \frac{1}{2}\right) \cup (1, \infty)$ (d) (1, ∞)

77. Let $\bar{V} = 2i + j - k$, $\bar{W} = i + 3k$, if $\bar{U}$ is a unit vector then the maximum value of $\bar{U}.(\bar{V} x \overline{W})$ is
(a) $\sqrt{33}$ (b) 7 (c) $\sqrt{59}$ (d) not defined

78. The distance of the plane passing through (1, 1, 1) and perpendicular to the line $\frac{x-1}{3} = \frac{y-1}{0} = \frac{z-1}{4}$
from the origin is
(a) $\frac{3}{4}$ (b) $\frac{4}{5}$ (c) $\frac{7}{5}$ (d) 0

79. The point in which the line joining of A(– 9, 4, 5) and B(11, 0, –1) is met by the perpendicular drawn from the origin
is
(a) (2, 2, 1) (b) (2, 1, 2) (c) (1, 2, 2) (d) (2, 2, 2)

80. The value of 'm' for which the straight line 3x – 2y + z + 3 = 0 = 4x – 3y + 4z + 1 is parallel to the plane
2x – y + mz – 2 = 0 is

(a) – 2 (b) 8 (c) 4 (d) 2

81. If 5 different things are placed at random in 3 different boxes, then the probability of placing them
such that no box remains empty is

(a) $\frac{30}{81}$ (b) $\frac{20}{81}$ (c) $\frac{50}{81}$ (d) $\frac{40}{81}$

82. Two person A and B toss a die one after another. The person who throws 6 wins. If A starts the game,
then the probability of his winning is

(a) $\frac{4}{11}$ (b) $\frac{3}{11}$ (c) $\frac{5}{11}$ (d) $\frac{6}{11}$

83. The Expansion $[x^2 + (x^6 - 1)^{1/2}]^5 + [x^2 - (x^6 - 1)^{1/2}]^5$ *is a* polynomial of degree.

(a) 8 (b) 10 (c) 13 (d) 14

84. If $\left|z - \frac{4}{z}\right|$=2, then the maximum value of $|z|$is

a) $\sqrt{3} + 1$ b) $\sqrt{5} + 1$ c) $\sqrt{5} - 1$ d) $\sqrt{3}$-1

85. For positive numbers x, y and z the numerical value of the determinant $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$ is

(a) 0 (b) 1 (c) $\log_e xyz$ (d) -log xyz

86. A five digit number divisible by 30 is to be formed using the digits 0,1,2,3,4,5 without repetition of
the digits. The number of ways it can be done is …..

(a) 36 (b)24 (c)48 (d)60

87. The Equation x - $\frac{2}{x-1} = 1 - \frac{2}{x-1}$ has

(a) no root (b) one root (c) two roots (d) infinitely many

88. $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ =$

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

Rough Space

89. Fractional part $\frac{2^{78}}{31}$ is

(a) $\frac{2}{31}$ (b) $\frac{4}{31}$ (c)$\frac{8}{31}$ (d) $\frac{10}{31}$

90. If $|z_1 + z_2| = |z_1 - z_2|$ then arg z_1-arg z_2=

a) 0 b) $\pm\frac{\pi}{4}$ c)$\pm\frac{\pi}{2}$ d)π