Time: 3Hours

JEE MAIN SAMPLE PAPER-1

CLASS:12th (PCM)

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: …………………………………………

Father's Name: …………………………………………………………………………………………………. Signature: …………………………………

Branch Name: …………………………………………………………………………………………………. Contact No: ………………………………

Rough Space

PART – A
(PHYSICS)

1. If pressure P, velocity V and time T are taken as fundamental physical quantities, then the dimensional formula for force is

(a) PV^2T^2 (b) $P^{-1}V^2T^{-2}$ (c) PVT^2 (d) $P^{-1}VT^2$

2. A projectile is given an initial velocity of $\left(\hat{i}+2\hat{j}\right)m/s$, where $\hat{i}$ is along the ground and $\hat{j}$ is along the vertical. If $g=10m/s^2$, the equation of its trajectory is:

(a) $y=x-5x^2$ (b) $y=2x-5x^2$ (c) $4y=2x-5x^2$ (d) $4y=2x-25x^2$

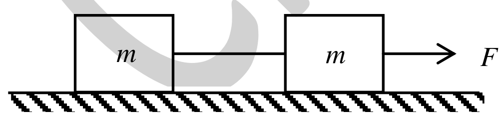
3. A boy runs along a straight path for the first half of the distance with a velocity v_1 and the second half of the distance with a velocity v_2. The average velocity V is given by

(a) $\frac{2}{V}=\frac{1}{v_1}+\frac{1}{v_2}$ (b) $V=\frac{v_1+v_2}{2}$ (c) $V=\sqrt{v_1v_2}$ (d) $\vec{V}=\vec{v}_1+\vec{v}_2$

4. Two blocks of equal mass are connected by a light string and placed on a smooth horizontal surface. If a force F acts on one of the block then the tension in the string is

(a) F (b) $\frac{F}{2}$

(c) $2F$ (d) $-F$



5. A cricket player catches a ball of mass 0.1 kg, moving with a speed of $10ms^{-1}$ in $0.1s$. Magnitude of the force exerted by him is (N)

(a) 10 (b) 4 (c) 2 (d) 1

6. A spring for spring constant $240\,Nm^{-1}$ is compressed by $10\ cm$ whereas another similar spring is extended by $10\ cm$. The difference of the stored potential energies of two springs is

(a) zero (b) 4 J (c) 1.2 J (d) 12 J

7. For an electron in the nth Bohr orbit of hydrogen atom, what will be the ratio of radius of orbit to its de-Broglie wavelength

(a) $\frac{n}{2\pi}$ (b) $\frac{n^2}{2\pi}$ (c) $\frac{1}{2\pi n}$ (d) $\frac{1}{2\pi n^2}$

8. If in a plano-convex lens radius of curvature of convex surface is 10 cm and the focal length of the lens is 30 cm, the refractive index of the material of the lens will be:

(a) 1.5 (b) 1.66 (c) 1.33 (d) 3

9. A body is projected at an angle θ to the horizontal with kinetic energy E_k. The potential energy of the body at the highest point of the trajectory is

(a) E_k (b) $E_k \cos^2\theta$ (c) $E_k \sin^2\theta$ (d) $E_k \tan^2\theta$

10. One gram of ice is mixed with one gram of steam. After thermal equilibrium, the temperature of the mixture is

(a) $0°C$ (b) $100°C$ (c) $55°C$ (d) $80°C$

11. A ray of light travelling in the direction $\frac{1}{2}\left(\hat{i}+\sqrt{3}\hat{j}\right)$ is incident on a plane mirror in the x-z plane .

After reflection, it travels along the direction $\frac{1}{2}\left(\hat{i}-\sqrt{3}\hat{j}\right)$. The angle of incidence is

(a) 30° (b) 45° (c) 60° (d) 75°

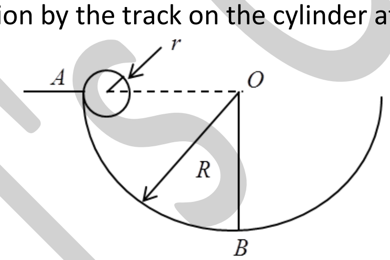
12. A radioactive nucleus (initial mass number A and atomic number Z) emits 3 $\alpha-$particles and 2 positrons. The ratio of number of neutrons to that of protons in the final nucleus will be

(a) $\frac{A-Z-8}{Z-4}$ (b) $\frac{A-Z-4}{Z-8}$ (c) $\frac{A-Z-12}{Z-4}$ (d) $\frac{A-Z-4}{Z-2}$

13. A cylinder of mass *m* and radius *r* rolls down a circular track from point *A* as shown in the figure. Assume that the friction is just sufficient to support the rolling. Velocity of the cylinder at point *A* was zero. Assume $r << R$. The reaction by the track on the cylinder at point B is

(a) $\frac{7}{3}mg$ (b) $\frac{4}{3}mg$

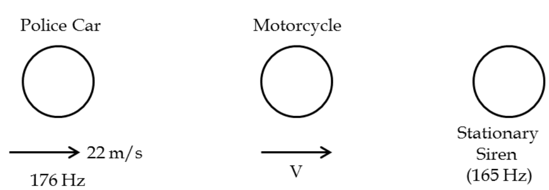
(c) $\frac{5}{3}mg$ (d) $\frac{2}{3}mg$



14. A charged particle of a mass m and charge q is released from rest in a uniform electric field E neglecting the effect of gravity, the kinetic energy of the charged particle after t second is

(a) $\frac{eqm}{t}$ (b) $\frac{E^2q^2t^2}{2m}$ (c) $\frac{2E^2t^2}{mg}$ (d) $\frac{Eq^2m}{2t^2}$

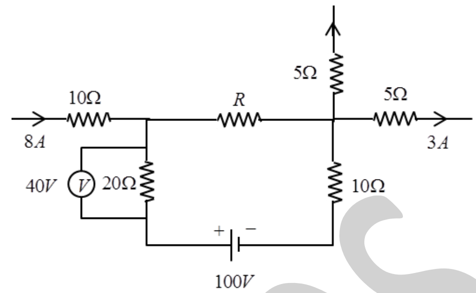
15. A police car moving at 22 m/s, chases a motorcyclist. The police man sounds his horn at 176 Hz, while both of them move towards a stationary siren of frequency 165 Hz. Calculate the speed of the motorcycle, if it is given that motor cyclist does not observes any beats.
(velocity of sound in air $=330m/s$)



(a) 33 m/s (b) 22 m/s
(c) 55 m/s (d) 11 m/s

Rough Space

16. In the circuit shown, the voltmeter reading is 40 V. Find the value of unknown resistor R



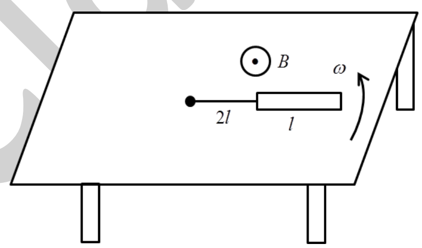
(a) 4Ω (b) 8Ω

(c) 5Ω (d) 10Ω

17. In young's double slit experiment, the intensity at a point where the path difference is $\frac{\lambda}{6}$ (λ being the wavelength of light used) is I . If I_0 denotes the maximum intensity, $\frac{I}{I_0}$ is equal to

(a) $\frac{3}{4}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{2}$

18. A metallic rod of length l is tied to a non-conducting string of length $2l$ and made to rotate with angular speed ω on a horizontal table with one end of the string fixed. If there is a vertical magnetic field B in the region, the emf induced across the ends of the rod is



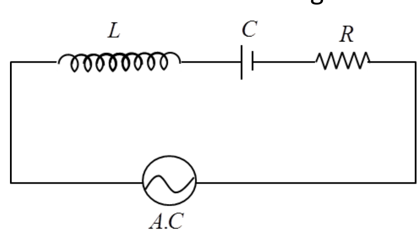
(a) $\frac{7B\omega l^2}{2}$ (b) $\frac{3B\omega L^2}{2}$

(c) $\frac{5B\omega l^2}{2}$ (d) $\frac{4B\omega L^2}{2}$

19. A wheel is rotating about a fixed axis through its centre 300 rpm. A constant torque starts acting on it opposes its motion. Before coming to rest it makes 25 complete rotations. If the moment of inertia of the wheel about the axis of rotation is $\left(\frac{10}{\pi}\right) Kg\, m^2$, the torque (in N-m) acting on it is

(a) 10 (b) 15 (c) 20 (d) 25

20. An inductance of $\frac{200}{\pi} mH$, a capacitance of $\frac{10^{-3}}{\pi} F$ and a resistance of 10Ω are connected in series with an a.c. source 220V, 50Hz. The phase angle of the circuit for the current and voltage source is



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

(c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$

Rough Space

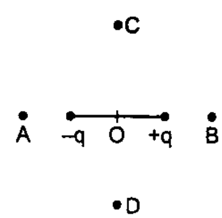
21. If an electron and a proton having same momenta enter perpendicular to a magnetic field, then
(a) the length of curved path of electron and proton will be same
(b) they will move undeflected
(c) the length of curved path of electron is more curved than that of the proton
(d) the length of curved path of proton is more curved than that of the electron

22. A heavy uniform chain lies on a horizontal table top. If the coefficient of friction between the chain and the table surface is 0.25, then the maximum fraction of the length of the chain that can hang over one edge of the table is
(a) 20% (b) 25% (c) 35% (d) 15%

23. A cylindrical tube, open at both ends, has a fundamental frequency f_0, in air. The tube is dipped vertically into water such that half of its length is inside water. The fundamental frequency of the air column now is
(a) $\frac{3f_0}{4}$ (b) f_0 (c) $\frac{f_0}{2}$ (d) $3f_0$

24. An infinite long straight wire is bent into a semicircle of radius R, as shown in the figure. A current I is sent through the conductor. The magnetic field at the centre of the semicircle is:
(a) infinite (b) zero
(c) $\frac{\mu_0 \pi I}{4\pi R}$ (d) $\frac{\mu_0}{4\pi}\frac{I}{R}(\pi+1)$

25. Choose the correct relation regarding potential of an electric dipole. Here A, B, C and D all are at equal distance from point O which is much larger than the dimensions of the dipole. Then
(a) $|V_A|=|V_B|>|V_C|=|V_D|$ (b) $|V_C|=|V_D|>|V_A|=|V_B|$
(c) $|V_A|>|V_C|=|V_D|>|V_B|$ (d) $|V_C|>|V_B|=|V_D|>|V_A|$



26. In an $A.C.$ circuit, V and I are given by $V=100\sin(100t)\,volt$, $I=100\sin\left(100t+\frac{\pi}{3}\right)A$ Then the power dissipated in the circuit is
(a) $10^4 W$ (b) $10W$ (c) $2500W$ (d) $5W$

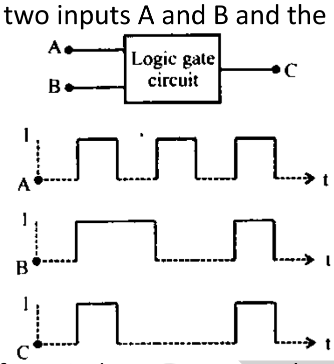
27. The magnetic flux ϕ (in weber) linked with a coil of resistance 10Ω varies with time t (in second) as $\phi=8t^2-4t+1.$ The current induced in the coil at $t=0.1\sec$ is
(a) $10A$ (b) $0.24A$ (c) $0.12A$ (d) $4.8A$

Rough Space

28. If R, C and L denote resistance, capacitance and inductance. Which of the following will NOT have the dimensions of frequency?

(a) RL^{-1} (b) R^1C^1 (c) $L^{-1/2}C^{-1/2}$ (d) RCL

29. The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage wavefront of A, B and C are as shown below



The logic circuit gate is

(a) NAND gate (b) NOR gate

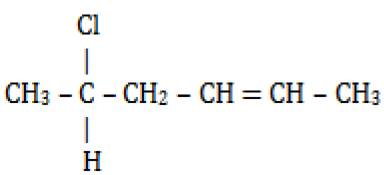
(c) OR gate (d) AND gate

30. If N_0 is the original mass of the substance of half-life period $t_{1/2} = 5$ years, then the amount of substance left after 15 years is

(a) $\frac{N_0}{8}$ (b) $\frac{N_0}{16}$ (c) $\frac{N_0}{2}$ (d) $\frac{N_0}{4}$

PART–B
CHEMISTRY

31. The IUPAC name of the following compound is:



(a) 2-chlorohex-5-ene (b) 5-chlorohex-2-ene

(c) 1-chloro-1-methylpent-3-ene (d) 5-chloro-5-methylpent-2-ene

32. Formation of polyethylene from calcium carbide takes place as follows:

$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$

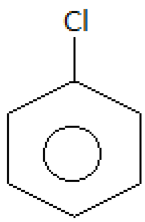
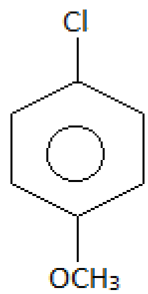
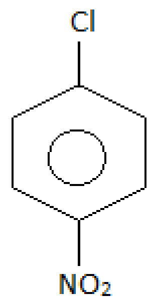
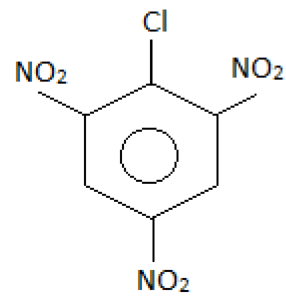
$C_2H_2 + H_2 \rightarrow C_2H_4$

$nC_2H_4 \rightarrow (-CH_2 - CH_2 -)_n$

the amount of polyethylene obtained from 64 kg of CaC_2 is

(a) 7 kg (b) 14 kg (c) 21 kg (d) 28 kg

33. Arrange the following compounds in order of increasing reactivity towards nucleophilic substitution.

(i)  (ii)  (iii)  (iv) 

(a) i< ii < iii < iv (b) iv > iii > ii > I (c) ii <i< iii < iv (d) iv < iii < ii <i

34. $A + SOCl_2 \rightarrow B + SO_2 + HCl$
$X + Na \rightarrow C + H_2$
$B + C \rightarrow (C_2H_5)_2O + NaCl$
Then A and X are respectively
(a) C_2H_5ONa and C_2H_5Cl (b) C_2H_5Cl and C_2H_5ONa
(c) C_2H_5OH and C_2H_5OH (d) C_2H_5OH and C_2H_5ONa

35. Natalite is a mixture of
(a) $CH_3OH + C_2H_5OH$ (b) $C_2H_5OH + (C_2H_5)_2O$
(c) $CH_3CHO + (C_2H_5)_2O$ (d) $CH_3COCH_3 + (C_2H_5)_2O$

36. $CH_3CHO + NH_2OH \rightarrow X \xrightarrow[-H_2O]{} Y$
The number of σ bonds, π bonds and lone pairs of electrons in the compounds 'y' are respectively
(a) 9, 1, 4 (b) 11, 1, 5 (c) 9, 2, 2 (d) 8, 1, 3

37. Order of decreasing acidity of
(I) HCOOH (II) CH_3COOH (III) $Cl_2CHCOOH$ (IV) CF_3COOH is

(a) IV > III > II > I (b) IV > III > I > II (c) III > IV > II > I (d) I >IV > II > III

38. What are A, B, C in the following reaction?
I. $(CH_3COO)_2Ca \xrightarrow{\Delta} A$ II. $CH_3CO_2H \xrightarrow[\text{Red P}]{HI} B$ III. $2CH_3CO_2H \xrightarrow{P_4O_{10}} C$

	A	B	C
(a)	C_2H_6	CH_3COCH_3	$(CH_3CO)_2O$
(b)	$(CH_3CO)_2O$	C_2H_6	CH_3COCH_3
(c)	CH_3COCH_3	C_2H_6	$(CH_3CO)_2O$
(d)	CH_3COCH_3	$(CH_3CO)_2O$	C_2H_6

Rough Space

39. The positive carbylamines test is given by
(i) N, N-dimethyl aniline (ii) 2, 4-dimethyl aniline
(iii) N-methyl-O-methyl aniline (iv) p-methyl benzylamine
(a) Only (i) (b) (ii) and (iv) (c) (iii) and (iv) (d) (i) and (iv)

40. The rate constant for the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ is 3.0× $10^{-5}s^{-1}$.If the rate is 2.40× $10^{-5}mol/L.sec^{-1}$,then the initial concentration of N_2O_5 (in mol/L) is
(a) 1.4 (b) 1.2 (c) 0.04 (d) 0.8

41. Sodium has a bcc structure with nearest neighbour distance of 365.9 pm. Calculate its density (atomic mass of sodium = 23)
(a) 1.51 g/cm^3 (b) 2.65 g/cm^3 (c) 3.3 g/cm^3 (d) 6.2 g/cm^3

42. The latent heat of Vaporisation of a liquid at 500k and 1atm pressure is 30 Kcal/mole. What will be the change in internal energy of 3 mol of liquid at same temperature?
(a)13 Kcal (b) -13 Kcal (c) 27Kcal (d) -27 Kcal

43. For the reaction

$$3Br_2 + 6OH^{\ominus} \longrightarrow 5Br^{\ominus} + BrO_3^{\ominus} + 3H_2O$$

Equivalent weight of $Br_2(Molecular\ weight\ M) is$
(a) $\frac{M}{2}$ (b) $\frac{M}{10}$ (c)$\left(\frac{M}{2} + \frac{M}{10}\right)$ (d) $\frac{M}{6}$

44. The specific conductance of saturated solution of Agcl is found to be 1.86×10^{-6} ohm^{-1} cm^{-1} and that of water is 6×10^{-8} ohm^{-1} cm^{-1}. The Solubility of Agcl is
Given Λ^0_{Agcl} = 137.2 $ohm^{-1}cm^2eq^{-1}$
(a)1.7×10^{-3}M (b)1.3×10^{-5}M (c)1.3×10^{-4}M (d)1.3×10^{-6}M

45. The vapour density of the equilibrium mixture of the reaction $SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2(g)}$ is 50. The percentage dissociation of SO_2Cl_2 is
(a) 33 (b) 35 (c) 30 (d) 66

46. The ionisation energy of hydrogen atom is 13.6 ev. What will be the ionisation energy of Li^{+2} ions?
(a)13.6 ev (b) 54.4 ev (c) 122.4 ev (d)48.6 ev

47. The first and second dissociation constants of an acid, H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The Overall dissociation constant of the acid will
(a) 0.2×10^{5} (b) 5.0×10^{-5} (c) 5.0×10^{-15} (d) 5.0×10^{15}

48. The density of Oxygen is 1.43 g/L at STP. The density of oxygen at 17^0c and 800 torr is
(a) 1.4 (b) 1.69 (c) 1.8 (d) 2.5

Rough Space

49. Match the List-I with List-II by using the postulates of VBT of complexes

List-I	List-II
(P) $[Ni(CN)_4]^{2-}$	(1) sp^3hybridization
(Q) $[Ni(CO)_4]$	(2) dsp^2hybridization
(R) $[Cu(NH_3)_4]^{2+}$	(3) $\mu = 0\ BM$
(S) $[Pd(CI)_4]^{2-}$	(4) μ =1.732 BM

(a) P-3,1 Q-1,4 R-2,3 S-1,4
(b) P-2,3 Q-1,3 R-1,4 S-2,3
(c)p-2,4 Q-1,4 R-2,4 S-2
(d) P-2,3 Q-1,3 R- 2,4 S-2,3

50. The incorrect order regarding 15 th group hydrides is
(a) Reducing nature : $NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$
(b) Bond angle :$NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$
(c) Basic nature : $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$
(d) Boiling point : $NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$

51. Which of the among the following is more acidic ?
(a) H_2O (b) H_2S (c)H_2Se (d) H_2Te

52. The true statement for the acids of phosphorus : H_3PO_2, H_3PO_3 and H_3PO_4 is
(a) The order of acidity is $H_3PO_2 < H_3PO_3 < H_3PO_4$
(b) All of these are reducing in nature
(c) All are tribasic acids
(d) The geometry of phosphorus is tetrahedral in all the three

53. The salt used for performing 'bead' test in qualitative inorganic analysis is :
(a) $K_2SO_4.AI_2(SO_4)_3.24H_2O$
(b) $FeSO_4.(NH_4)_2SO_4.6H_2O$
(c) Na $(NH_4)HPO_4.4H_2O$
(d) $Na_2SO_4.Cr_2(SO_4)_3.24H_2O$

54. Which are true statements among the following ?
(A) PH_5 and $BiCl_5$ do not exist
(B) Bond order of CO_3^{-2} is 1.33
(C) SeF_4 and CH_4have same shape
(D) I_3^+has bent geometry
(E) The number of $P_\pi - d_\pi$ bonds in SO_2&$SO_3$are same
(a) A&C (b) A,B&E (c) A,B&D (d) all the above

55. The increasing order of acidic nature of the following oxidies is
(a) $SiO_2 < P_2O_5 < CI_2O_7 < SO_3$
(b) $SiO_2 < P_2O_5 < SO_3 < CI_2O_7$
(c) $CI_2O_7 < SO_3 < P_2O_5 < SiO_2$
(d) $SO_3 < CI_2O_7 < SiO_2 < P_2O_5$

56. An orange coloured solution acidified with H_2SO_4 and treated with a substance'X' gives a blue coloured

solution of CrO_5. The substance 'X'is :
(a) H_2O (b) dil HCl (c) H_2O_2 (d) Conc. HCl

57. In E. Coli DNA, AT/GC ratio of is 0.93. If the number of moles of adenine in the DNA sample is 465,000, then the moles of guanine present is
(a) 465,000 (b) 535,000 (c) 50,000 (d) 93,000

58. An example of a condensation homopolymer is
(a) Ethylene (b) Melamine-formaldehyde resin (c) Alkyd resin (d) Perlon or Nylon-6

59.

Column I	Column II
(A) Antacid *(B)* Antibiotic *(C)* Traquillizer *(D)* Antioxidant	(p) Equanil (q) BHT (r) Brompheniramine (s) Aminoglycosides

(a) A-p; B-q; C-s; D-r (b) A-q; B-p; C-r; D-s
(c) A-r; B-s; C-p; D-q (d) A-r; B-s; C-q; D-p

60. The smog is essentially caused by presence of
(a) O_2 and O_3 (b) O_3 and N_2 (c) Oxides of sulphur and nitrogen (d) O_2 and N_2

PART – C
MATHEMATICS

61. OPQR is a set 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. $P \rightarrow (q \vee r)$ 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. $\underset{x \to 0}{\text{Lt}} \frac{1-\cos^3 x}{\sin 3x \sin 5x} =$

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

68. $\text{Sin}^{-1}x + \text{Sin}^{-1}y = \pi/2$ 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 extremurm 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 $y\left(e^{\pi/2}\right)$ =

(a) π/2 (b) $e^{\pi/2}$ (c) 1 (d) e

76. If the angle between $\bar{a} = \lambda\hat{\imath} - 3\hat{\jmath} - k$, $\bar{b} = 2\lambda\hat{\imath} + \lambda\hat{\jmath} - k$, 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 $[\bar{U}\bar{V}\bar{W}]$ 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 join of A(– 9, 4, 5) and B(11, 0, –1) is met by the perpendicular 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 $\left[x^2 + (x^6 - 1)^{1/2}\right]^5 + \left[x^2 - (x^6 - 1)^{1/2}\right]^5$ *is a* polynomial of degree.
(a) 8 (b) 10 (c) 13 (d) 14

Rough Space

84. If $\left|z-\frac{4}{2}\right|$=2, then the maximumvalue 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 with our 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

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