Test Id: 613031

Part - A Physics

Section - I: Single Correct

This section contains a total of 20 questions.
All questions in this section are mandatory.
For every correct response you shall be awarded 4 marks.
For every incorrect response -1 marks shall be deducted.

1. A block of mass 4 kg is moving on a frictionless horizontal surface with velocity 2 m/s and comes to rest after pressing a spring. If the force constant of the spring is 100 N/m then the compression in the spring will be:

   (a) 0·8 m

   (b) 1·6 m

   (c) 0·4 m

   (d) 3·2 m

2. Two particles having same specific charge are accelerated through same potential difference and are released into a magnetic field, which is perpendicular to their velocities. What will be the ratio of radii of circles traced by two particles if masses of particles are in ratio 1:2?

   (a) 4:1 (b) 1:1

   (c) 2:1 (d) 1:4

3. A rope of length L and mass M hangs freely from the ceiling. If the time taken by a transverse wave to travel from the bottom to the top of the rope is T, then time to cover first half length is

   (a) T

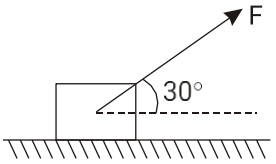
   (b) $T\left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$

   (c) $\frac{T}{\sqrt{2}}$

   (d) $\frac{T}{2}$

4. Water droplets are coming from an open tap at a particular rate. The spacing between a droplet observed at 4^{th} second after its fall to the next droplet is 34.3 m. At what rate the droplets are coming from the tap? (Take $g = 9.8\ m/s^2$)

5. As shown in the figure, a block of mass 10 kg lying on a horizontal surface is pulled by a force F acting at an angle 30° with the horizontal. For $\mu_s = 0.25$, the block will just start to move for the value of F [Given $g = 10\ ms^{-2}$]



   (a) 25.2 N

   (b) 33.3 N

   (c) 20 N

   (d) 35.7 N

6. Given below are two statements:
   Statement I: In Rutherford's model, most of the mass of the atom and all its positive charge are concentrated in a tiny nucleus and the electrons revolve around it.
   Statement II: An atom being a spherical cloud of positive charges with electrons embedded in it, is a special case of Rutherford's model.
   In light of the above statements, choose the most appropriate from the options given below.

   (a) Both statement I and statement II are false

   (b) Both statement I and statement II are true

   (c) Statement I is true but statement II is false

   (d) Statement I is false but statement II is true

7. A linear harmonic oscillator of force constant 6×10^5 N/m and amplitude 4 cm, has a total energy 600 J. Select the correct statement.

   (a) Maximum potential energy is 600 J

   (b) Maximum kinetic energy is 480 J

   (c) Minimum potential energy is 120 J

   (d) All of these

8. Which of the following is true?

   (a) Diamagnetism is temperature dependent

   (b) Paramagnetism is temperature dependent

   (c) Paramagnetism is temperature independent

   (d) None of these

9. A solid cylinder of mass 2 kg and radius 50 cm rolls up

an
inclin

(a) 1 drop / 7 seconds

(b) 3 drops / 2 seconds

(c) 2 drops / second

(d) 1 drop / second

ed plane of angle of inclination 30°. The centre

of mass of the cylinder has speed of 4 m/s. The distance travelled by the cylinder on the inclined surface will be, (take g = 10 m/s^2)

(a) 2.2 m

(b) 1.6 m

(c) 1.2 m

(d) 2.4 m

10. A spherical ball collides with a smooth horizontal surface in the XZ plane with a velocity, $\vec{v} = a\hat{i} - b\hat{j}$. If the coefficient of restitution of collision is e, then the velocity of the ball just after the impact will be,

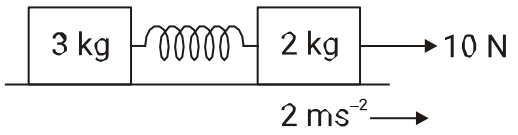
(a) $a\hat{i} + b\hat{j}$

(b) $a\hat{i} + eb\hat{j}$

(c) $a\hat{i} - b\hat{j}$

(d) $a\hat{i} - eb\hat{j}$

11. Find the acceleration of 3 kg mass when the acceleration of 2 kg mass is 2 m/s^2 as shown in the figure?



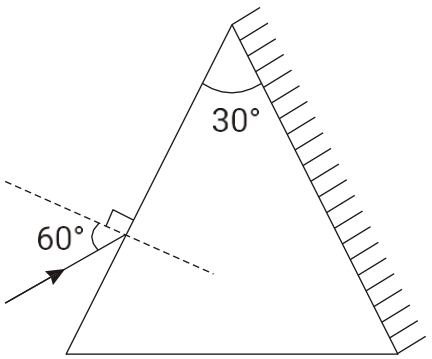
(a) 3 m/s^2

(b) 2 m/s^2

(c) 0.5 m/s^2

(d) Zero

12. An isosceles prism of angle $A = 30°$ has one of its surfaces silvered. Light rays falling at an angle of incidence $60°$ on the other surface retrace their path after reflection from the silvered surface. The refractive index of the prism material is



(a) 1.414

(b) 1.5

(c) 1.732

(d) 1.866

13. A body A of mass *m* is moving in a circular orbit of radius R about a planet. Another body B of mass $\frac{m}{}$

(c) Falls vertically downwards towards the planet

(d) starts moving in a elliptical orbit around the planet

14. When the angle of incidence from air on a material is $60°$, the reflected light is completely polarized. The velocity of the refracted ray inside the material is (in ms^{-1}):

(a) 3×10^8

(b) $\left(\frac{3}{\sqrt{2}}\right) \times 10^8$

(c) $\sqrt{3} \times 10^8$

(d) 0.5×10^8

15. A ball of mass *m* and density ρ is immersed in a liquid of density 3ρ at a depth *h* and released. To what height will the ball jump up above the surface of liquid? (neglect the resistance of water and air)

(a) *h*

(b) $\frac{h}{2}$

(c) $2h$

(d) $3h$

16. A kite is 120 m high and 130 m of string is out. If the kite is moving away horizontally at the rate of 52 m/s, find the rate at which the string is being pulled out.

(a) 20 m/s

(b) 30 m/s

(c) 40 m/s

(d) 50 m/s

17. In an A.C circuit, the instantaneous voltage $e(t)$ and current $I(t)$ are given by $e(t) = 5[\cos \omega t + \sqrt{3}\sin \omega t]$ volt $i(t) = 5\left[\sin\left(\omega t + \frac{\pi}{4}\right)\right]$ amp then :-

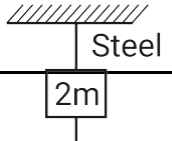
(a) Current leads voltage by $\frac{\pi}{4}$

(b) Voltage leads current by $\frac{\pi}{3}$

(c) Voltage leads current by $\frac{\pi}{6}$

(d) Current leads voltage by $\frac{\pi}{12}$

18. If ratio of diameters, lengths and Young's modulus of steel and copper wire shown in the figure are *p*, *q* and *s* respectively, then find the corresponding ratio of increase in their lengths?



collides with A with a velocity which is half $(\frac{\vec{v}}{2})$ the instantaneous velocity $\vec{v}$ of A. The collision is headon, completely inelastic. Then, the combined body : 2

(a) Escapes from the planet's Gravitational field

(b) Continues to move in a circular orbit

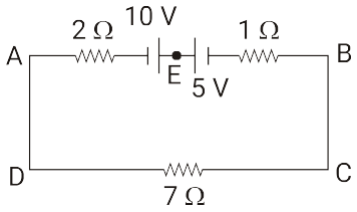
(a) $\frac{5q}{7sp^2}$

(b) $\frac{7q}{5sp^2}$

(c) $\frac{2q}{5sp}$

(d) $\frac{7q}{5sp}$

19. The magnitude and direction of the current in the following circuit is:-



(a) 0.5 A from A to B through E

(b) $\frac{5}{9}$ A from A to B through E

(c) 1.5 A from B toA through E

(d) 0.2 A from B to A through E

20. The electric potential V at a point P(x, y, z) in space is given by $V = 4x^2$ Volt. The electric field at a point (1m, 0, 2m) in V/m is

(a) 8 along the –ve x-axis

(b) 8 along the +ve x-axis

(c) 16 along the –ve x-axis

(d) 16 along the +ve x-axis

Section - II: Integer

This section contains a total of 5 questions. All questions in this section are mandatory.
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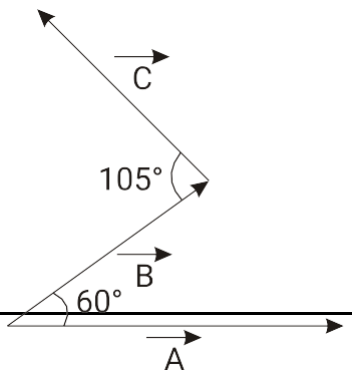
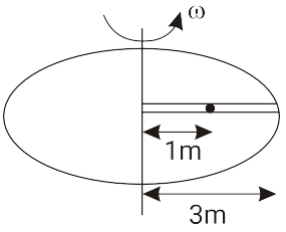
21. In the given figure, if the angle between the vectors A and –C is $5\alpha°$, then find the value of α.

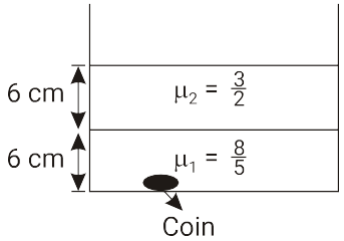


22. A circular table is rotating with an angular velocity of $\omega = \frac{1}{\sqrt{2}}$ rad/s about its axis (see figure). There is a smooth groove along a radial direction on the table. A steel ball is gently placed at a distance of 1 m from the axis on the groove. All the surfaces are smooth. If the radius of the table is 3 m, the radial velocity of the ball w.r.t. the table at the time the ball leaves the table is:



23. A solid sphere of mass 500 g and radius 5 cm is rotated about one of its diameters with an angular speed of 10 rad s^{-1}. If the moment of inertia of the sphere about its tangent is $x \times 10^{-2}$ times its angular momentum about the diameter, the value of x will be ..... .

24. Two immiscible liquids of refractive indices $\frac{8}{5}$ and $\frac{3}{2}$ respectively are put in a beaker as shown in the figure. The height of each column is 6 cm. A coin is placed at the bottom of the beaker. For near normal vision, the apparent depth of the coin is $\frac{\alpha}{4}$ cm. The value of α is ____.



25. $\vec{F}$ is in Newton and x is in meter. The work done by this force during a displacement from x = 0 to x = 4 m, is..... J.

A force $\vec{F} = (2 + 3x)\hat{i}$ acts on a particle in the x direction where

Part - B Chemistry

Section - I: Single Correct

This section contains a total of 20 questions. All questions in this section are mandatory.
For every correct response you shall be awarded 4 marks. For every incorrect response -1 marks shall be deducted.

26. What is the total number of atoms present in 64 gm of SO_2 ?

(a) $2 \times 6.02 \times 10^{23}$

(b) 6.02×10^{23}

(c) $4 \times 6.02 \times 10^{23}$

(d) $3 \times 6.02 \times 10^{23}$

27. $Mg_2C_3 + H_2O \longrightarrow (A) \xrightarrow{Na} (B) \xrightarrow{CH_3Br} (C)$;

The incorrect statement for C is

(a) Compound (C) is $CH_3 - C \equiv C - CH_3$

(b) (C) gives positive Tollen's test

(c) In compound (C) all four carbon are linearly present

(d) Compound (C) on ozonolysis gives diketone

28. A mixture of 100 m mol of $Ca(OH)_2$ and 2 g of sodium sulphate was dissolved in water and the volume was made up to 100 mL. The mass of calcium sulphate formed and the concentration of OH^- in resulting solution, respectively, are (Molar mass of $Ca(OH)_2$, Na_2SO_4 and $CaSO_4$ are 74, 143 and 136 g mol^{-1}, respectively; K_{sp} of $Ca(OH)_2$ is 5.5×10^{-6})

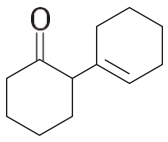
(a) 1.9 g, 0.14 mol L^{-1}

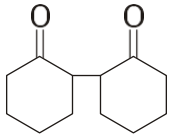
(b) 13.6 g, 0.28 mol L^{-1}

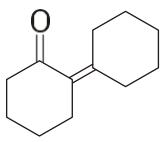
(c) 13.6 g, 0.14 mol L^{-1}

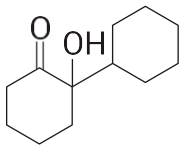
(d) 1.9 g, 0.28 mol L^{-1}

29. Cyclohexylamine when treated with nitrous acid yields (P). On treating (P) with PCC results in (Q). When (Q) is heated with dil. NaOH we get (R).
The final product (R) is

(a) 

(b) 

(c) 

(d) 

30. The structural formula of the compound which yields ethylene upon reaction with zinc

31. Which one of the following metal salts produces a blue-colored bead in the cobalt nitrate charcoal cavity test?

(a) Zn^{2+} (b) Mg^{2+}

(c) Sn^{2+} (d) Al^{3+}

32. Which of the following bond orders is an indication of existence of a molecule ?

(a) Zero bond order

(b) Negative bond order

(c) Positive bond order

(d) All of these

33. Consider the following statements:
I. Electronegativity generally increases across a period from left to right.
II. The attraction between the outer electrons and the nucleus increases as the atomic radius decreases in a period.
III. The increase in electronegativities across a period is accompanied by an increase in non-metallic properties.
IV. The valence of representative elements is always equal to the number of electrons in the outermost orbitals.
Choose the option with incorrect statements:

(a) Only IV

(b) I, II and IV

(c) Only II

(d) II and III

34. At temperature T, a compound $AB_2(g)$ dissociates according to the reaction, $2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$ with a degree of dissociation 'x' which is small as compared to unity. The expression for K_p in terms of 'x' and total pressure P is

(a) $\frac{Px^3}{2}$

(b) $\frac{Px^2}{3}$

(c) $\frac{Px^3}{3}$

(d) $\frac{Px^2}{2}$

35. What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid -

(a) (b)

Cr^{3+} and Cr_2O^{2-} are formed

(a) $CH_2Br—CH_2Br$

(b) $CHBr_2—CHBr_2$

(c) CHBr=CHBr

(d) None

O nlyCr_2O^{2-} is formed

(c) CrO_4^{2-} is reduced to +3 state of Cr

(d) $Cr_2O_4^{2-}$ is oxidised to +7 state of Cr

36. A group which deactivates the benzene ring towards electrophilic substitution but directs the incoming group towards o- and p- positions is

(a) $-NH_2$

(b) $-Cl$

(c) $-NO_2$

(d) $-C_2H_6$

37. What is the equivalent weight of $Na_2S_2O_3$ (Mol. wt = M) in the following reaction?

$2\,Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + NaI$

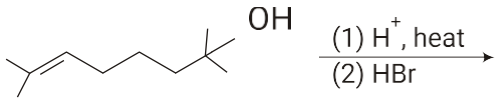
(a) $\frac{M}{4}$

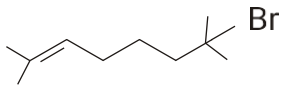
(b) $\frac{M}{3}$

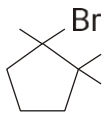
(c) $\frac{M}{2}$

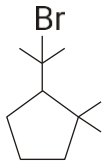
(d) M

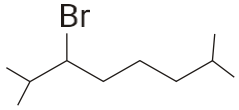
38. The major product in the given reaction is



(a) 

(b) 

(c) 

(d) 

39. The energy required to break one mole of Cl – Cl bonds in Cl_2 is 242 kJ mol^{-1}. The longest wavelength of light capable of breaking a single Cl – Cl bond is ($c = 3 \times 10^8$ ms^{-1} and $N_A = 6.02 \times 10^{23}$ mol^{-1})

(a) 594 nm

(b) 640 nm

(c) 700 nm

(d) 494 nm

40. The four compounds are given below:
(1) CH_3COCH_3 (2) C_2H_5CHO (3) C_6H_5CHO
(4) C_2H_5OH
In case of these compounds which one of the following

(c) 1, 2 and 4 give haloform reaction

(d) Only 1 and 2 undergo aldol condensation

41. The rate constant is given by the equation $k = P \cdot Ze^{-Ea/RT}$. Which factor should register a decrease for the reaction to proceed more rapidly?

(a) T (b) Z (c) E_a (d) P

42. Statement I: Dissolution of sugar in water proceed via increases in entropy.
Statement II: Entropy decreases when egg is hard boiled.

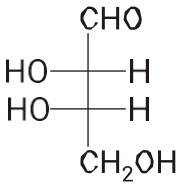
(a) Statement I and Statement II are true and the Statement II is the correct explanation of the Statement I

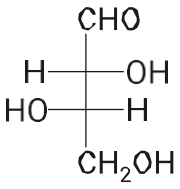
(b) Statement I and Statement II are true but the Statement II is not the correct explanation of the Statement I

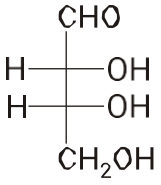
(c) Statement I is true but Statement II is false

(d) Statement I and Statement II are false

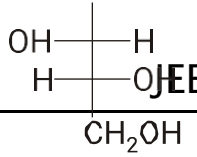
43. L-isomer of a compound 'A' ($C_4H_8O_4$) gives a positive test with $[Ag(NH_3)_2]^+$. Treatment of 'A' with acetic anhydride yield triacetate derivative.
Compound 'A' produces an optically active compound (B) and an optically inactive compound (C) on treatment with bromine water and HNO_3 respectively, compound (A) is:

(a) 

(b) 

(c) 

(d)



statements is true?

(a) 1, 2 and 4 undergo aldol condensation

(b) 2 and 3 undergo Cannizzaro's reaction

44. The correct combination is:

(a) $[NiCl_4]^{2-}$ - square-planar; $[Ni(CN)_4]^{2-}$ - paramagnetic

(b) $[Ni(CN)_4]^{2-}$ - tetrahedral; $[Ni(CO)_4]^{2-}$ - paramagnetic

(c) $[NiCl_4]^{2-}$ - paramagnetic; $[Ni(CO)_4]$ - tetrahedral

(d) $[NiCl_4]^{2-}$ - diamagnetic; $[Ni(CO)_4]$ - square-planar

45. The EMF of the cell M | M^{n+} (0.02 M) || H^+ (1 M) | H_2 (g) (1 atm), Pt at 25°C is 0.81 V. The valency of the metal if the standard oxidation potential of the metal is 0.76 V ?

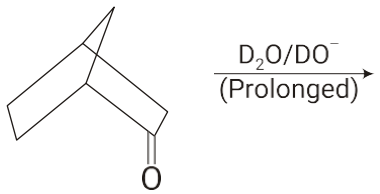
(a) 5 (b) 2 (c) 4 (d) 3

Section - II: Integer

This section contains a total of 5 questions. All questions in this section are mandatory.
For every correct response you shall be awarded 4 marks.
For every incorrect response -1 marks shall be deducted.

46. The number of atoms in 8 g of sodium is Z × 10^{23}.

The value of Z is_____.(Nearest integer)
[Given: N_a = 6.02 × 10^{23} mol^{-1}
Atomic mass of Na = 23.0 u]

47. 

How many hydrogen atoms is/are replaced by (D)?

48. When 10 mL of an aqueous solution of $KMnO_4$ was titrated in an acidic medium, an equal volume of 0.1 M of an aqueous solution of ferrous sulphate was required for complete discharge of color. The strength of $KMnO_4$ in grams per liter is _____× 10^{-2}. (Nearest integer)
[Atomic mass of K = 39, Mn = 55, O = 16]

49. How many of the following reaction are possible?
(i) $MgCl_2 + NaNO_3 \rightarrow$ (ii) $BaSO_4 + HCl \rightarrow$ (iii) $ZnSO_4 +$ BaS → (iv) $BaCO_3 + CH_3COOH \rightarrow$

50. 25 mL of an aqueous solution of KCl was found to require 20 mL of 1 M $AgNO_3$ solution when titrated using K_2CrO_4 as an indicator. What is the depression in freezing point of KCl solution of the given concentration? _____(Nearest Integer).
(Given: K_f = 2.0 K kg mol^{-1})
Assume (1) 100% ionization and
(2) Density of the aqueous solution as 1 g mL^{-1}.

Part - C Mathematics

51. A variable point P on an ellipse of eccentricity 3/4 is joined to its foci S, S' then the locus of the incentre of the $\Delta PSS'$ is an ellipse. If λ be the eccentricity of the ellipse, then find the value of 5λ.

(a) 3 (b) 5
(c) 9 (d) None

52. A variable triangle ABC is circumscribed about a fixed circle of unit radius. Side BC always touches the circle at fixed point D. If B and C vary in such a way that $BD \cdot DC = 2$, then the locus of vertex A will lie on straight line

(a) Parallel to side BC
(b) Perpendicular to side BC
(c) Making an angle of $\frac{\pi}{6}$ with side BC
(d) Making an angle of $\sin^{-1}(\frac{2}{3})$ with side BC

53. Let Q be the cube with the set of vertices $\{(x_1, x_2, x_3) \in R^3 : x_1, x_2, x_3 \{0, 1\}\}$. Let F be the set of all twelve lines containing the diagonals of the six faces of the cube Q. Let S be the set of all four lines containing the main diagonals of the cube Q; for instance, the line passing through the vertices $(0, 0, 0)$ and $(1, 1, 1)$ is in S. For lines l_1 and l_2, let $d(l_1, l_2)$ denote the shortest distance between them. Then the maximum value of $d(l_1, l_2)$, as l_1 varies over F and l_2 varies over S, is

(a) $\frac{1}{\sqrt{6}}$
(b) $\frac{1}{\sqrt{8}}$
(c) $\frac{1}{\sqrt{3}}$
(d) $\frac{1}{\sqrt{12}}$

54. If $\log_{(e+\pi)} \log_2(\sqrt{4x+1} + \sqrt{4x}) = 0$, $x \in R$, then $64x$ is equal to

(a) 1
(b) 3
(c) 9
(d) 12

55. Number of words that can be formed using all the letters of the word 'H I P H I P H U R R A Y' in which all H's lies somewhere between R's is

Section - I: Single Correct

This section contains a total of 20 questions. All questions in this section are mandatory.
For every correct response you shall be awarded 4 marks.
For every incorrect response -1 marks shall be deducted.

(a) $(198)7!$

(b) $(99)7!$

(c) $(99)8!$

(d) $(198)8!$

56. If G is centroid of ΔABC and $\vec{AB} = \vec{a}, \vec{AC} = \vec{b}$ then $\vec{AG}$ equals -

(a) $\frac{1}{2}(\vec{a} + \vec{b})$

(b) $\frac{1}{3}(\vec{a} + \vec{b})$

(c) $\frac{2}{3}(\vec{a} + \vec{b})$

(d) $\frac{1}{6}(\vec{a} + \vec{b})$

57. Value of $I = \int_0^{\infty} \frac{\ln x}{x^2 + 6x + 9}\, dx$

(a) $\frac{\ln 3}{12}$

(b) $\frac{\ln 3}{6}$

(c) $\frac{\ln 3}{2}$

(d) $\frac{\ln 3}{3}$

58. If $a\sin^2\vartheta + b\cos^2\vartheta = m$, $b\sin^2\phi + a\cos^2\phi = n$, $a\tan\vartheta = b\tan\phi$, then which of the following is true?

(a) $\frac{1}{n} - \frac{1}{m} = \frac{1}{a} - \frac{1}{b}$

(b) $\frac{1}{n} + \frac{1}{m} = \frac{1}{a} + \frac{1}{b}$

(c) $m^2 + n^2 = a^2 + b^2$

(d) $m^2 - n^2 = a^2 - b^2$

59. Let $f(x) = \begin{cases} xe^{ax}; & x \le 0 \\ x + ax^2 - x^3; & x > 0 \end{cases}$

where a is positive constant. The interval in which $f'(x)$ is increasing is

(a) $(-\infty, \infty)$

(b) $\left(-\infty, -\frac{2}{a}\right) \cup \left(\frac{a}{3}, \infty\right)$

(c) $\left(-\frac{2}{a}, \frac{a}{3}\right)$

(d) $(0, \infty)$

(a) 0.936

(b) 0.784

(c) 0.904

(d) 0.216

62. $\lim_{n\to\infty} \cos(\pi\sqrt{n^2 + n})$ = when n is an integer:

(a) is equal to 1

(b) is equal to −1

(c) is equal to zero

(d) does not exist

63. For the parabola $y^2 = 4x$. Let P be the point of concurrency of three normals and S be the focus. If α_1, be the sum of the angles made by three normals from the positive directions of x-axis and α_2 be the angles made by PS with the positive directions of x-axis then $\frac{\alpha_1 - \alpha_2}{\pi}$ can be equal to

(a) 1 or 2

(b) $\frac{1}{2}$ or $\frac{3}{2}$

(c) $\frac{5}{2}$ or $\frac{3}{2}$

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

64. The area of the triangle formed by joining the origin to the points of intersection of $\sqrt{5}x + 2y = 3\sqrt{5}$ and $x^2 + y^2 = 10$ is:

(a) 6 (b) 5

(c) 4 (d) 3

65. $\int_4^3 e^{x\sin x + \cos x} \left(\frac{x\cos x - x\sin x + \cos x}{x^2\cos^2 x}\right) dx =$

(a) $e^{x\sin x+\cos x}\left(x - \frac{1}{\cos x}\right) + c$

(b) $e^{x\sin x+\cos x}\left(x - \frac{1}{x\cos x}\right) + c$

(c) $e^{x\sin x+\cos x}\left(1 - \frac{1}{x\cos x}\right) + c$

(d) $e^{x\sin x+\cos x}\left(1 - \frac{1}{\cos x}\right) + c$

60. If a, b, c are in G.P., then

(a) a^2, b^2, c^2 are in G.P.

(b) $a^2(b+c), c^2(a+b), b^2(a+c)$ are in G.P.

(c) $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in G.P.

(d) None of the above

61. The probability of happening an event A in one trial is 0.4. The probability that the event A happens at least once in three independent trials is

66. The area enclosed by the closed curve C given by the differential equation $\frac{dy}{dx} + \frac{x+a}{y-2} = 0, y(1) = 0$ is 4π. Let P and Q be the points of intersenction of the curve C and the y–axis. If normals at P and Q on the curve C intersect x–axis at points R and S respectively, then the length of the line segment RS is:

(a) 2

(b) $\frac{2\sqrt{3}}{3}$

(c) $2\sqrt{3}$

(d) $\frac{4\sqrt{3}}{3}$

67. If $f:(0,\pi) \to R$, is defined by

$f(x) = \sum_{k=1}^{kx} [1 + \sin(\frac{}{n})]$, where $[x]$ denotes the integral part of x, then the range of $f(x)$ is

(a) $\{n-1, n+1\}$

(b) $\{n-1, n, n+1\}$

(c) $\{n, n+1\}$

(d) none of these

68. If the orthogonal square matrices A and B satisfy $|A| + |B| = 0$, where $|A|$ denotes determinant of matrix A, then the value of $|A + B|$ is necessarily

(a) 0

(b) 1

(c) -1

(d) none of these

69. If the imaginary part of the expression $\frac{z-1}{e^{\vartheta i}} + \frac{e^{\vartheta i}}{z-1}$ be zero, then the locus of z can be

(a) straight line parallel to x-axis

(b) a parabola

(c) a circle of radius 1

(d) none of these

70. If $2x = y^{1/5} + y^{-1/5}$, then $(x^2-1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} =$

(a) $5y$

(b) $25y$

(c) $\frac{\sqrt{2}}{2}$

(d) 2

Section - II: Integer

This section contains a total of 5 questions. All questions in this section are mandatory.
For every correct response you shall be awarded 4 marks. For every incorrect response -1 marks shall be deducted.

71. Number of integral terms in the expansion of $\{7^{(\frac{1}{2})} + 11^{(\frac{1}{6})}\}^{824}$ is equal to ____.

73. Seven digits from the number $1, 2, 3, 4, 5, 6, 7, 8$ & 9 are written in random order. The probability that this seven digit number is divisible by 9 is $\frac{p}{q}$ then q equals. (Where p & q are co-prime natural numbers)

74. Let P_n denotes the number of ways of selecting 3 people out of $'n'$ sitting in a row, if no two of them are consecutive and Q_n is the corresponding figure when they are in a circle. If $P_n - Q_n = 6$, then $\frac{'n'}{2}$ is equal to:

75. Find the number of integral values of x satisfying the equation
$|x^4 \cdot 3^{|x-2|} \cdot 2^{|x-5|} \cdot 5^{x-1}| = -x^4 \cdot 3^{|x-2|} \cdot 2^{|x-5|} \cdot 5^{x-1}$.

72. The roots α and β of a quadratic equation are the squares of two consecutive natural numbers. The geometric means of the two roots is 1 greater than the positive difference of the roots. If exactly one roots of $x^2 - kx + 32 = 0$ lies between α and β then find the number of integral value(s) of k.