Previous Paper Questions

1. Q.Id: 161794

Which product of the following reactions fails to give carbylamine test?

A) Hoffman-bromamide degradation

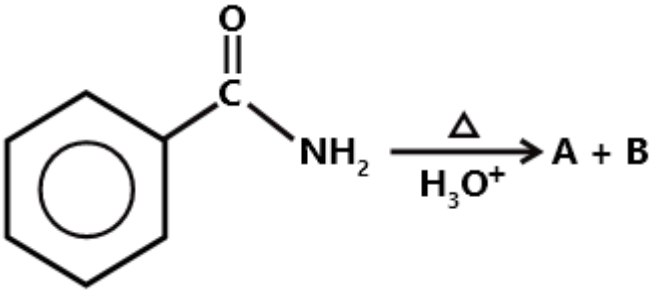
B) gabriel phthalimide synthesis

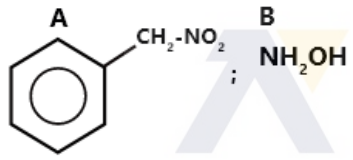
C) Reduction of nitrites with $LiAlH_4$

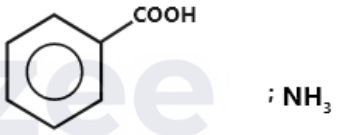
D) Reduction of tertiary amides with $LiAlH_4$

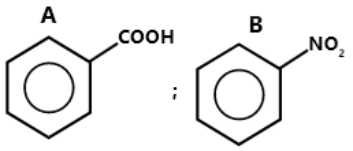
2. Q.Id: 161792

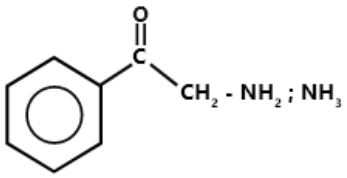
Identify A and B in the following reaction



A) 

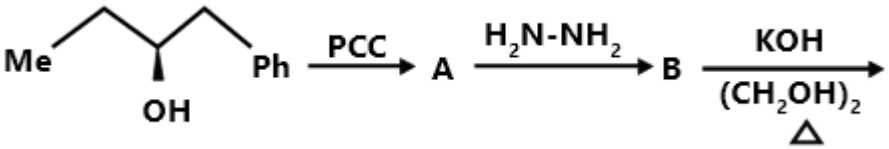
B) 

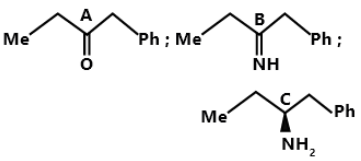
C) 

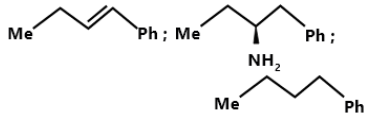
D) 

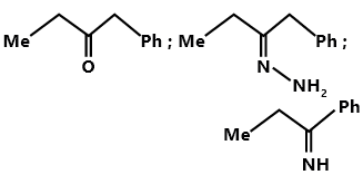
3. Q.Id: 161790

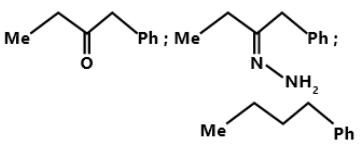
The products A,B and C in the following reaction sequence are



A) 

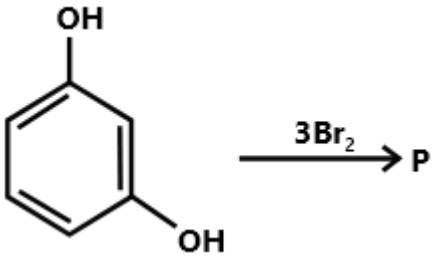
B) 

C) 

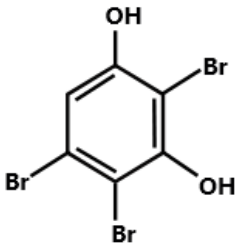
D) 

4. Q.Id: 161787

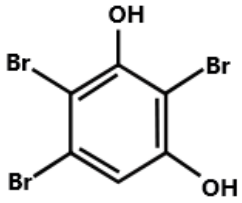
The product (P) of the below reaction is



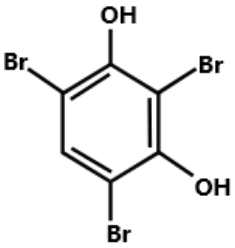
A)



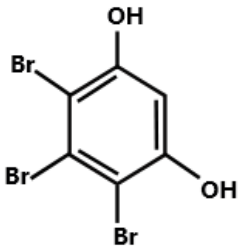
B)



C)

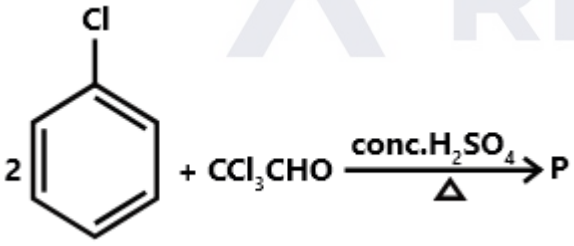


D)

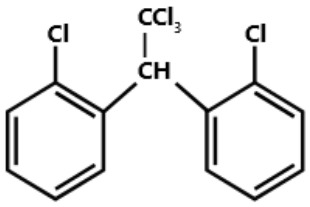


5. Q.Id: 161786

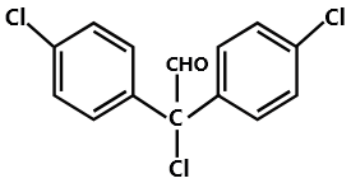
Themajor product (P) formed in the following reaction is



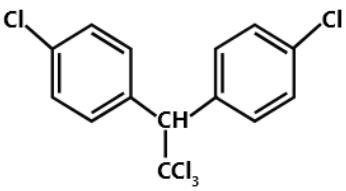
A)



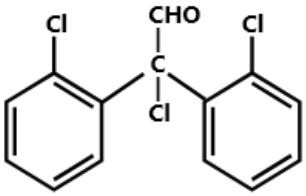
B)



C)



D)



6. Q.Id: 161783

Identify an antioxidant, an antiseptic, and an antibiotic respectively from the following.

(A) Equanil

(B) Chloramphenicol

(C) Bithionol

(D) Aspartame

(E) Dimetapp

(F) Butylated hydroxytoluene

A) A, C, E

B) F, C, B

C) B, D, E

D) C, D, F

7. Q.Id: 161782

Which of the following carbohydrates has a glycosidic linkage?

A) Fructofuranose

B) Glucopyranose

C) Maltose

D) β-D-fructose

8. Q.Id: 161778

The formation of terylene (or dacron) from ethylene glycol and terephthalic acid is

A) a condensation polymerisation reaction

B) an anionic polymerisation reaction

C) an addition polymerisation reaction

D) a cationic polymerisation reaction

9. Q.Id: 161777

Which of the following molecules/ions can exhibit isomerism?

(i) Tetrahedral $NiCl_2Br_2^{2-}$

(ii) Square planar $Pt(NH_3)_2Cl_2$

(iii) Octahedral $Co(NH_3)_3Cl_3$

(iv) Square planar $Pd(NH_3)_3Br^+$

(v) Octahedral $Co(en)_3^{3+}$

where, (en) = 1,2 - diaminoethane

A) (i),(ii),(iii),(iv)

B) (ii),(iii),(v)

C) (ii),(iii),(iv)

D) (i),(ii),(iii),(v)

10. Q.Id: 161776

Which of the following sets correctly represent the increasing paramagnetic property of the ion?

A) $Cu^{2+} < V^{2+} < Cr^{2+} < Mn^{2+}$

B) $Cu^{2+} < Cr^{2+} < V^{2+} < Mn^{2+}$

C) $Mn^{2+} < V^{2+} < Cr^{2+} < Cu^{2+}$

D) $Mn^{2+} < Cu^{2+} < Cr^{2+} < V^{2+}$

11. Q.Id: 161664

What are X and Y, respectively in the following reactions ?

$Au + aqua - regia \rightarrow AuCl_4^- + H_2O + X$

$Pt + aqua - regia \rightarrow PtCl_6^{2-} + H_2O + Y$

A) N_2O, NO

B) N_2O, N_2O

C) NO, NO

D) NO, NO_2

12. Q.Id: 161663

Identify the reactions in which N_2 is liberated

(i) $(NH_4)_2SO_4 + NaOH \rightarrow$

(ii) $NH_3 + Cl_2 \rightarrow$

(iii) $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta}$

(iv) $NH_4NO_3 \xrightarrow{\Delta}$

(v) $NH_4Cl(aq) + NaNO_2(aq) \rightarrow$

A) (i), (ii), (iii)

B) (iii), (iv), (v)

C) (ii), (iii), (v)

D) (i), (iii), (iv)

13. Q.Id: 161662

Identify the correct set of sulphide ores from the followinng.

A) Fool's gold, calamine, kaolinite

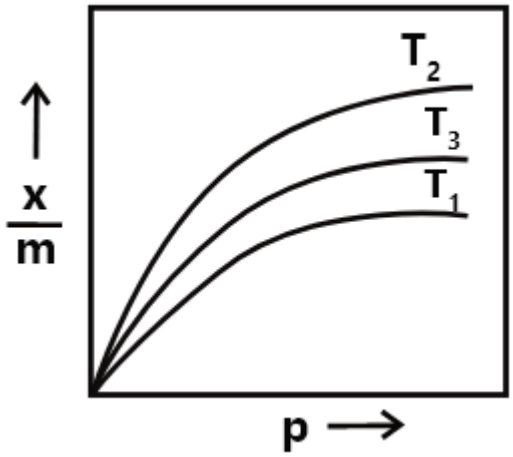
B) Sphalerite, fool's gold, chalcopyrites

C) Copper glance, siderite, malachite

D) Bauxite, magnetite, zincite

14. Q.Id: 161661

The following graph is obtained for physisorption of a gas as a function of pressure at different temperatures.



The correct order of temperatures is

A) $T_3 < T_2 < T_1$

B) $T_2 < T_3 < T_1$

C) $T_2 < T_1 < T_3$

D) $T_1 < T_3 < T_2$

15. Q.Id: 161660

If the rate constants of a reaction at 500 K and 700 K are $0.002 s^{-}$ and $0.06 s^{-}$ respectively, the value of activation energy is (R = 8.314 $J mol^{-1} K^{-1}$, log 3 = 0.477)

A) 49.49 kJ mol^{-1}

B) 98.98 kJ mol^{-1}

C) 24.75 kJ mol^{-1}

D) 12.37 kJ mol^{-1}

16. Q.Id: 161659

The EMF of a galvanic cell consisting of two hydrogen electrodes is 0.17 V. If the solution of one of the electrodes has $[H^+] = 10^{-3}$ M, the pH at the other electrode is

A) 5.87

B) 4.88

C) 2.08

D) 3.08

17. Q.Id: 161658

At 300 K, a one litre solution of sucrose (molecular weight : 342) was prepared by dissolving 40 g of sucrose. What is the approximate osmotic pressure (in kPa) of solution at the same temperature? (R = 8.314 x $10^6 cm^3 Pa K^{-1} mol^{-1}$)

A) 292

B) 500

C) 292000

D) 600

18. Q.Id: 161657

A litre of sea water (which weights 1030 g) contains 6 x 10^{-3} g of dissolved oxygen. The concentration of dissolved oxygen in ppm is

A) 5.8 **B)** 6.0

C) 6.2 **D)** 6.4

19. Q.Id: 161656

A compound is formed by elements of X, Y and Z. Atoms of Z (anions) make fcc lattice. Atoms of X (cations) occupy all the octahedral voids. Atoms of Y (cations) occupy $\frac{1}{3}^{rd}$ of the tetrahedral voids.The formula of the compound is

A) $X_3Y_2Z_3$ **B)** X_2YZ

C) XY_2Z **D)** X_3Y_2Z

20. Q.Id: 161654

The major product obtained in the reaction of isobutyl benzene with acetic anhydride in the presence of anhydrous$AlCl_3$ is

A) p-isobutyl acetophenone **B)** acetophenone

C) m - isobutyl acetophenone **D)** o - isobutyl acetophenone

21. Q.Id: 161652

What are the products formed in the reaction given below?

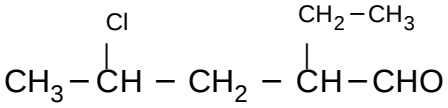
$$Ph-CH_2-CH=CH-CH_3 \xrightarrow[(ii)\ Zn+H_3O]{(i)\ O_3} ?$$

A) Acetic acid and 2 - phenyl acetic acid **B)** 2 - phenyl ethanal and ethanal

C) 2 - phenyl ethanol and ethanol **D)** 1 - phenyl butan -2, 3 -diol

22. Q.Id: 161651

IUPAC name for the following compound is



A) 2 - chloro - 4 - ethylpentanal **B)** 2 - ethyl - 4 - chloropentanal

C) 4 - chloro - 2 - ethylpentanal **D)** 2 - chlorohexane - 4 - al

23. Q.Id: 161644

When vegetation is burnt in the absence of Oxygen, which of the following will be lormed?

A) CH_4

B) $H_2C = CH_2$

C) $H-C\equiv C-H$

D) H_3C-CH_3

24. Q.Id: 161642

Si reacts withCH_3Cl at 573 K in the presence f Cu powder to form methyl substituted chlorosilanes. Among the given methyl substituted chlorosilanes, whose yield is minimum?

A) CH_3SiCl_3

B) $(CH_3)_2SiCl_2$

C) $(CH_3)_3SiCl$

D) $(CH_3)_4Si$

25. Q.Id: 161641

Identify the correct statements from the following:

(i) Inorthoboric acid, boron is in planar geometry

(ii) In BCl_3,NH_3, **boron has tetrahedral geometry**

(iii) Aqueous solution of borax is acidic

A) (i), (ii)

B) (ii), (iii)

C) (i), (iii)

D) (i), (ii), (iii)

26. Q.Id: 161639

When sodium (Na) metal is dissolved in liquid ammonia (NH_3), it imparts a blue colour to the solution. This blue colouration is due to

A) liquidNH_3

B) $\left[Na(NH_3)_2\right]^+$

C) $NaNH_2$

D) $\left[\bar{e}(NH_3)_x\right]^-$

27. Q.Id: 161637

Match the reactants in List - I with the products in List - II.

List1	List2
A. H_2O+H_2S	I. (H_3O^+,HS^-)
B. H_2O+N^{3-}	II. (NH_3,OH^-)
C. $H_2O+SiCl_4$	III. (OH^-,H_3S^+)
D. H_2O+F_2	IV. (SiO_2,HCl)
E. .	V. (SiO_4^{4-},Cl_2)
F. ..	VI. (O_2,F)
G. None	VII. (HF,OH)
H. none	VIII. (OH^-,HN_3)

A) A->i, B->viii, C->v, D->vi

B) A->iii, B->ii, C->v, D->vi

C) A->iii, B->viii, C->iv, D->vii

D) A->i, B->ii, C->iv, D->vi

28. Q.Id: 161633

The degree of dissociation of 0.1 N CH_3COOH is (given $K_a = 1\times10^{-5}$) approximately

A) 1×10^{-6}

B) 1×10^{-7}

C) 1×10^{-3}

D) 1×10^{-2}

29. Q.Id: 161632

For a reaction $2A(g) \rightleftharpoons 2B(g) + C(g)$. $K_c = 3.75 \times 10^{-6}$ at 1069 K. **. The approximate value of K_p for this reaction at the same temperature is (R = 0.082 L bar mol^{-1} K^{-1})**

A) 2.4×10^{-4}

B) 3.3×10^{-4}

C) 33×10^{2}

D) 7.2×10^{4}

30. Q.Id: 161627

At 298 K. the equilibrium constant of the process $1.5O_2(g) \rightleftharpoons O_3(g)$ is 3×10^{-29}. Standard free energy change (in kJ mol^{-1}) of the process is approximately (R = 8.314 J mol^{-1} K^{-1}; log 3 = 0.47)

A) 724

B) 612

C) 247

D) 163

31. Q.Id: 161626

When 10 g of 90% pure limestone is heatthe approximate volume (in L) of Co. liberated at STP is

A) 4.4

B) 2.0

C) 4.0

D) 22.4

32. Q.Id: 161625

In the titration of I_2(aq) by $S_2O_3^{2-}$ (aq) using the starch indicator, the end point is indicated by

A) colourless to blue

B) blue to colourless

C) pink to colourless

D) blue to pink

33. Q.Id: 161624

The kinetic energy in J of 1 mole of N_2 at 27^oC is ($R = 8.314$ J $mol^{-1}K^{-1}$)

A) 2.494

B) 18.706

C) 7.482

D) 3.741

34. Q.Id: 161622

Which of the following represents van der Waals' equation for n moles of the gas?

A) $\left(p + \frac{a}{V^2}\right)(V - b) = nRT$

B) $p(V - b) = nRT$

C) $\left(p + \frac{a}{V^2}\right)V = nRT$

D) $pV + \frac{an^2}{V} - \frac{abn^3}{V^2} - pnb = nRT$

35. Q.Id: 161618

The molecular orbital theory supports paramagnetic behaviour of

A) Be_2

B) C_2

C) N_2

D) O_2

36. Q.Id: 161615

The correct order of bond angles of the given compounds is

A) $NH_3 < PH_3 < AsH_3 < SbH_3$

B) $SbH_3 < AsH_3 < PH_3 < NH_3$

C) $NH_3 < AsH_3 < SbH_3 < PH_3$

D) $PH_3 < SbH_3 < AsH_3 < NH_3$

37. Q.Id: 161611

The co valencyof Al in $[AICI(H_2O)_5]^{2+}$ is

A) 3

B) 5

C) 1

D) 6

38. Q.Id: 161609

Covalent bond length of chlorine molecule is 1.98 $\overset{o}{A}$. Covalent radius (in $\overset{o}{A}$) of chlorine atom is

A) 1.98

B) 0.99

C) 3.96

D) 0.49

39. Q.Id: 161594

The wavelength (in m) of a particle of mass 11.043 x10^{-26} kg moving with a velocity of 6.0 x10^7 ms^{-1} is

A) 1.0×10^{16}

B) 6.0×10^{-16}

C) 1.0×10^{-16}

D) 6.0×10^{16}

40. Q.Id: 161590

The energy of an electron in the 3rd orbit of H-atom (in J) is approximately.

A) -218×10^{-18}

B) -2.42×10^{-19}

C) -1.21×10^{-19}

D) -3.63×10^{-19}

41. Q.Id: 161551

A carrier of peak voltage 20 V is used to transmit a message signal. for getting a modulation index of 60%, the peak voltage of the modulating signal is

A) 6 V

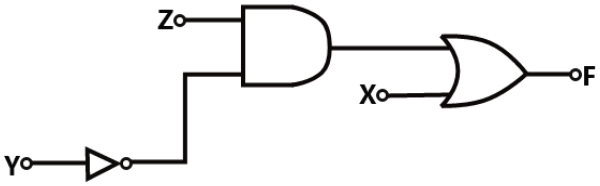
B) 8 V

C) 12 V

D) 33.3 V

42. Q.Id: 161550

The output F of the logic circuit given below is



A) $X+\overline{Y}.Z$

B) $(Y+Z).X$

C) $(\overline{Y}+Z)+X$

D) $X+\overline{Y}+Z$

43. Q.Id: 161549

Consider an amplifier circuit, where in a transistor is used in common emitter mode. The change in collector current and base current respectively are 4 mA and $20\ \mu A$ **when a signal of 40 mv is added to the base - emitter voltage. If the load resistance is** $10\ k\Omega$**, then power gain in the circuit is**

A) 1×10^{4}

B) 2×10^{7}

C) 8×10^{5}

D) 1×10^{6}

44. Q.Id: 161544

An active nucleus decays to $\left(\frac{1}{3}\right)^{rd}$ **in 20 h. The fraction of original activity remaining after 80 h is**

A) $\frac{1}{16}$

B) $\frac{1}{81}$

C) $\frac{1}{36}$

D) $\frac{1}{54}$

45. Q.Id: 161542

The de-Broglie wavelength of an electron of kinetic energy 9 eV is (take $h=4\times10^{-15}\ eV-s$**,** $c=3\times10^{10}\ cm/s$ **and the mass** m_e **of electron as** $m_ec^2=0.5\ MeV$**)**

A) $4\times10^{-8}\ cm$

B) $3\times10^{-8}\ cm$

C) $4\times10^{-7}\ cm$

D) $3\times10^{-7}\ cm$

46. Q.Id: 161538

At an incident radiation frequency of v_1, which is greater than the threshold frequency, the stopping potential for a certain metal is V_1. At frequency $2v_1$, the stopping potential is $3V_1$. If the stopping potential at frequency $4v_1$ in nV_1, then n is

A) 2

B) 3

C) 6

D) 7

47. Q.Id: 161534

A 100 W electric bulb produces electromagnetic radiation with electric field amplitude of $\frac{2V}{m}$ at a distance of 10 m. Assuming it s a point source, estimate the efficiency of the bulb.

A) 4.9 %

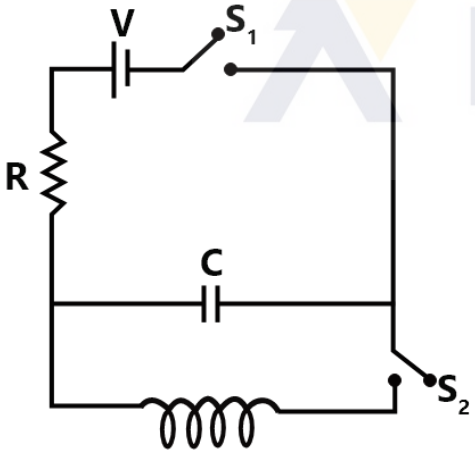
B) 2.5 %

C) 6.6 %

D) 19.7 %

48. Q.Id: 161532

In the circuit given below, the capacitor C is charged by closing the switch S_1 and opening the switch S_2. After charging, the switch S_1 is opened and S_2 is closed, then the maximum current in the circuit.



A) $V\sqrt{\frac{L}{C}}$

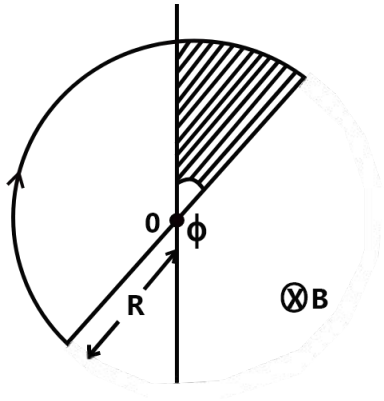
B) $V\sqrt{\frac{C}{L}}$

C) $\frac{V}{2\pi}\sqrt{\frac{L}{C}}$

D) $2\pi V\sqrt{\frac{L}{C}}$

49. Q.Id: 161529

A wire loop enclosing a semi - circle of radius R is located on the boundary of a uniform magnetic field of induction B. At time $t = 0$, the loop is set into rotation with angular velocity angular ω about its axis 0, coinciding with a line vector B on the boundary as shown in the figure. The emf induced in the loop is:



A) $\frac{BR^2}{2}\omega$

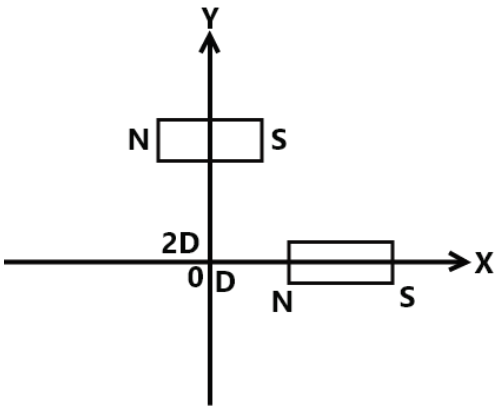
B) $BR\omega$

C) $BR^2\omega$

D) $\frac{BR^2}{2\omega}$

50. Q.Id: 161526

A bar magnet of magnetic moment M is placed at a distance D with its axis along positive X - axis. Like wise, second bar magnet of magnetic moment M is placed at a distance 2D on positive Y - axis and perpendicular to it as shown in the figure. The magnitude of magnetic field at the origin is $|B| = \alpha\left[\frac{\mu_0}{4\pi}\frac{M}{D^3}\right]$. The value of α must be (assume $D >> l$, where l is the length of magnets)



A) 2

B) $\frac{15}{8}$

C) $\frac{17}{8}$

D) $\frac{9}{8}$

51. Q.Id: 161522

A non - conducting thin disc of radius R rotates about its axis with an angular velocity ω. The surface charge density on the disc varies with the distance r from the centre as $\sigma(r) = \sigma_0\left[1+\left(\frac{r}{R}\right)^{\beta}\right]$, where σ_0 and β are constants. If the magnetic induction at the centre is $B = \left(\frac{9}{10}\right)\mu_0\sigma_0\omega R$, the value of β is

A) $\frac{1}{4}$

B) 4

C) $\frac{1}{2}$

D) 2

52. Q.Id: 161518

Two circular loops L_1 and L_2 of wire carrying equal and opposite currents are placed parallel to each other with a common axis. The radius of loop L_1 is R_1 and that of L_2 is R_2. The distance between the centres of the loops is $\sqrt{3}R_1$. The magnetic field at the centre of L_2 shall be zero, if

A) $R_2 = 4R_1$

B) $R_2 = 2R_1$

C) $R_2 = \sqrt{2}R_1$

D) $R_2 = 8R_1$

53. Q.Id: 161512

A tapered bar of length L and end diameters D_1 and D_2 is made of a material of electrical resistivity ρ. The electrical resistance of the bar is

A) $\frac{4\rho L}{\pi(D_1+D_2)^2}$

B) $\frac{4\rho L}{\pi(D_1-D_2)^2}$

C) $\frac{\rho\pi\sqrt{D_1D_2}}{4L^2}$

D) $\frac{4\rho L}{\pi D_1D_2}$

54. Q.Id: 161509

Consider the following two circuits

(A) 20 bulbs are connected in series to a power supply line.

(B) 20 bulbs identical to [A] re connected in a parallel circuit to an identical power supply line.

Identify which of the following is not true ?

A) If one bulb in [A] blows out, all others will stop glowing.

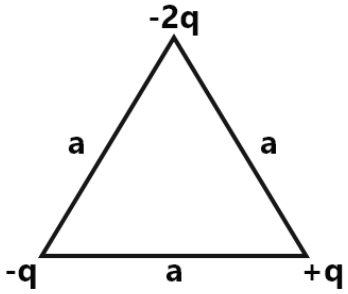
B) Bulbs in [A] glow brighter, since the current flowing in [A] is higher

C) If one bulb in [B] blows, other bulbs will still glow

D) Bulbs in [B] have the highest voltage across each bulb

55. Q.Id: 161506

The work done to assemble the three charges in a configuration as shown in the figure below is



A) $\frac{-3q^2}{4\pi\varepsilon_0 a}$

B) $\frac{-2q^2}{4\pi\varepsilon_0 a}$

C) $\frac{-q^2}{4\pi\varepsilon_0 a}$

D) 0

56. Q.Id: 161505

A point charge of $50\ \mu C$ **is placed in the XY plane at a location with radius vector** $r_0 = 2\hat{i} + 3\hat{j}\ m$**. The electric field strength and its magnitude at a point with radius vector** $r = 8\hat{i} - 5\hat{j}\ m$ **is** ($\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/N-m^2$)

A) 4.5 kV/m

B) 45 kV/m

C) 0.45 kV/m

D) 450 kV/m

57. Q.Id: 161493

Interference fringes are obtained in a Young's double slit experiment using beam of light consisting two wavelengths 500 nm and 600 nm. Bright fringes due to both wavelengths coincide at 2.5 mm from the central maximum. If the separation between the slits is 3 mm, then the distance between the screen and plane of the slits is :

A) 1.2 m

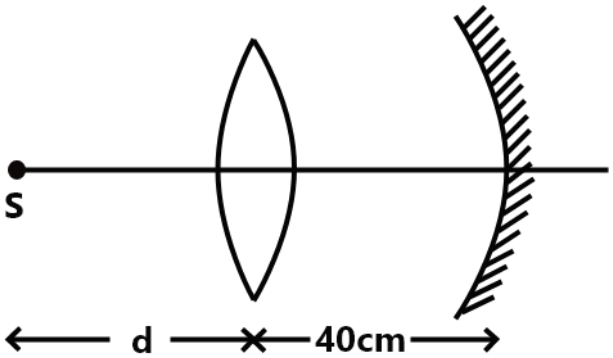
B) 2.8 m

C) 2.5 m

D) 3.2 m

58. Q.Id: 161489

A converging mirror is placed on the right hand side of a converging lens as shown in the figure. The focal length of the mirror and the lens are 20 cm and 15 cm, respectively. The separation between the lens and the mirror is 40 cm and their principal axis coincide. A point source is placed on the principal axis at a distance d to the left of the lens. If the final beam comes out parallel to the principal axis, then the value of d is



A) 4 cm

B) 8 cm

C) 12 cm

D) 16 cm

59. Q.Id: 161486

Where should an object be placed on the axis of a convex lens of focal length 8 cm, so as to achieve magnification of -4**? (Distances are measured from optic centre of the lens)**

A) -6 cm

B) -10 cm

C) -12 cm

D) -9 cm

60. Q.Id: 161483

Two harmonic travelling waves are described by the equation $y_1 = a\sin(kx-\omega t)$ **and** $y_2 = a\sin(-kx+\omega t+\phi)$**. The amplitude of the superimposed wave is**

A) $2a\cos\frac{\phi}{2}$

B) $2a\sin\phi$

C) $2a\cos\phi$

D) $2a\sin\frac{\phi}{2}$

61. Q.Id: 161477

An air bubble rises from the bottom of a water tank of height 5 m. If the initial volume of the bubble is $3\ mm^3$**, then what will be its volume as it reaches the surface? Assume that its temperature does not change [** $g = 9.8\ m/s^2$**,** $1\ atm = 10^5\ Pa$**, density of water = 1 gm/cc]**

A) $1.5\ mm^3$

B) $4.5\ mm^3$

C) $9\ mm^3$

D) $6\ mm^3$

62. Q.Id: 161470

The efficiency of Carton engine is η, when its hot and cold reservoirs are maintained at temperature T_1 and T_2 respectively. To increase the efficiency to $1.5\,\eta$, the increase in temperature (ΔT) of the hot reservoir by keeping the cold one constant at T_2 is

A) $\dfrac{T_1T_2}{(1-\eta)(1-1.5\,\eta)}$

B) $\dfrac{0.5T_2\eta}{(1-1.5\,\eta)(1-\eta)}$

C) $\dfrac{T_1}{(1-\eta)}-\dfrac{T_2}{(1-1.5\,\eta)}$

D) $\dfrac{(1-\eta)(1-1.5\,\eta)}{T_1T_2}$

63. Q.Id: 161469

The internal energy of the air, in a room of volume V, at temperature T and with outside pressure p increasing linearly with time, varies as

A) Increases linearly

B) Increases Exponentially

C) Decreases linearly

D) Remains Constant

64. Q.Id: 161468

A one mole of ideal gas goes through a process in which pressure p varies with volume V as $p=3-g\left(\dfrac{V}{V_0}\right)^2$ **. where** V_0 **is a constant. the maximum attainable temperature by the ideal gas during this process is (all quantities are is SI units and R is gas constant)**

A) $\dfrac{2V_0}{3R}$

B) $\dfrac{2V_0}{R}$

C) $\dfrac{3V_0}{2R}$

D) None of these

65. Q.Id: 161467

Consider a vessel filled with a liquid up to height H. The bottom of the vessel lies in the XY - Plane passing through the origin. the density of the liquid varies with Z - axis as $\rho(x)=\rho_0\left[2-\left(\dfrac{z}{H}\right)^2\right]$**. If** p_1 **and** p_2 **are the pressures at th bottom surface and top surface of the liquid, the magnitude of** (p_1-p_2) **is**

A) ρ_0gH

B) $\dfrac{8}{5}\rho_0gH$

C) $\dfrac{3}{2}\rho_0gH$

D) $\dfrac{5}{3}\rho_0gH$

66. Q.Id: 161464

A steel rod has radius 50 mm and length 2m. It is stretched along its length with a force of 400 kN. This causes an elongation of 0.5 mm. Find the (approximate) Young's modulus of steel from this information.

A) $2\times10^{10}\ Nm^2$

B) $10^{11}\ Nm^2$

C) $2\times10^{11}\ Nm^2$

D) $10^{12}\ Nm^2$

67. Q.Id: 161461

The ratio of the height above the surface of earth to the depth below, the surface of earth, for gravitational accelerations to be the same (assuming small heights) is

A) 0.25

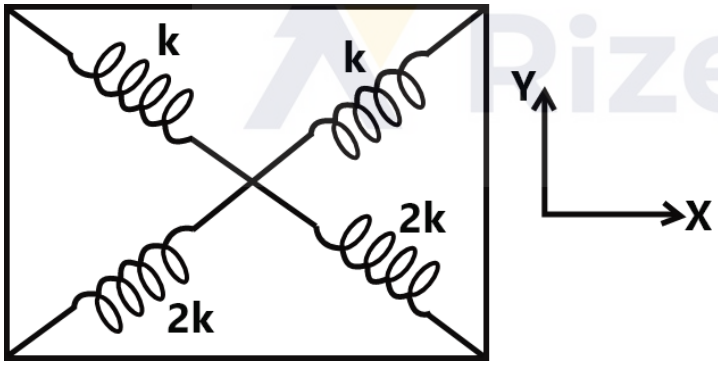
B) 0.5

C) 1.0

D) 1.25

68. Q.Id: 161458

A particle of mass m is attached to four springs with spring constant k, k, 2k and 2k as shown in the figure. Four springs are attached to the four corners of a square and a particle is placed at the centre. If the particle is pushed slightly towards any sides of the square and released, the period of oscillation will be



A) $2\pi\sqrt{\frac{m}{3k}}$

B) $2\pi\sqrt{\frac{m}{3\sqrt{2}k}}$

C) $2\pi\sqrt{\frac{m}{6k}}$

D) $2\pi\sqrt{\frac{m}{2k}}$

69. Q.Id: 161457

A solid sphere of radius R makes a perfect rolling down on a plane which is inclined to the horizontal axis at an angle θ. If the radius of gyration is k, then its acceleration is

A) $\frac{g\sin\theta}{\left(1+\frac{k^2}{R^2}\right)}$

B) $\frac{g\sin\theta}{(R^2+k^2)}$

C) $\frac{g\sin\theta}{2(R^2+x^2)}$

D) $\frac{g\sin\theta}{2\left(1+\frac{k^2}{R^2}\right)}$

70. Q.Id: 161452

A machine gun can fire 200 bullets/min. If 35 g bullets are fired at a speed of 750 m/s, then the average force exerted by the gun on the bullets is

A) 87.5 N

B) 26.2 N

C) 78.9 N

D) 110.3 N

71. Q.Id: 161450

A ball of mass 1 kg moving long x - direction collides elastically with a stationary ball of mass m. The first ball (mass = 1 kg) recoils at right angle to its original direction of motion. If the second ball starts moving at an angle 30° with the X - axis, then the value of m must be

A) 0.5 kg

B) 1.5 kg

C) 2.5 kg

D) 2 kg

72. Q.Id: 161439

An object moves along the circle with normal acceleration proportional to t^α, where t is the time and α is a positive constant. The power developed by all the forces acting on the object will have time dependence proportional to :

A) $t^{\alpha-1}$

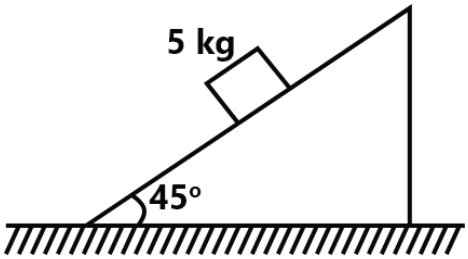
B) $t^{\alpha/2}$

C) $t^{\frac{1+\alpha}{2}}$

D) $t^{2\alpha}$

73. Q.Id: 161371

block of mass 5 kg is kept against an accelerating wedge with a wedge angle of 45° to the horizontal. The coefficient of friction between the block and the wedge is $\mu = 0.4$. What is the minimum absolute value of the acceleration of the wedge to keep the block steady ? (Assume, $g = 10\ m/s^2$)



A) $\frac{60}{7}\ m/s^2$

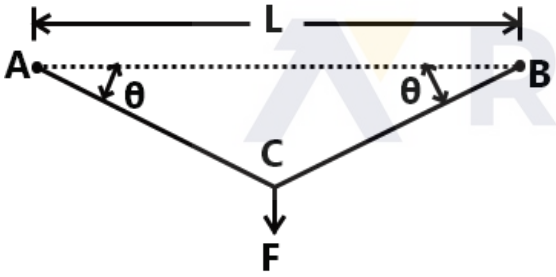
B) $\frac{30}{7}\ m/s^2$

C) $\frac{30}{\sqrt{7}}\ m/s^2$

D) $\frac{60}{\sqrt{7}}\ m/s^2$

74. Q.Id: 161370

String AB of unstretched length L is stretched by applying a force F at the mid point C such that the segments AC and BC make an angle θ with AB as shown in the figure. The string may be considered as an elastic element with a force to elongation ratio K. The force F is given by



A) $KL(1-\tan\theta)\sin\theta$

B) $2KL(1-\cos\theta)\tan\theta$

C) $KL(1-\cos\theta)\tan\theta$

D) $2KL(1-\sin\theta)\tan\theta$

75. Q.Id: 161366

Two objects are located at height 10 m above the ground. At some point of time, the objects are thrown with initial velocity $2\sqrt{2}\ m/s$ at an angle 45° and 135° with the positive X - axis, respectively. Assuming $g = 10\ m/s^2$, the velocity vectors will be perpendicular to each other at time is equal to

A) 0.2 s

B) 0.4 s

C) 0.6 s

D) 0.8 s

76. Q.Id: 161362

The magnitude of velocity and acceleration and velocity of a particle moving in a plane, whose position vector $\vec{r} = 3t^2\hat{i} + 2t\hat{j} + \hat{k}$ at $t = 2s$ are respectively

A) $\sqrt{148}, 6$

B) $\sqrt{144}, 6$

C) $\sqrt{13}, 3$

D) $\sqrt{14}, 3$

77. Q.Id: 161353

Consider a particle moving along the positive direction of X - axis. The velocity of the particle is given by $v = \alpha\sqrt{x}$ (α is a positive constant). At time t = 0, if the particle is located at x = 0, the time dependence of the velocity and the acceleration of the particle are respectively.

A) $\frac{\alpha^2}{2}t \,\&\, \frac{\alpha^2}{2}$

B) $\alpha^2 t \,\&\, \alpha^2$

C) $\frac{\alpha}{2}t \,\&\, \frac{\alpha}{2}$

D) $\frac{\alpha^2}{4}t \,\&\, \frac{\alpha^2}{4}$

78. Q.Id: 161350

A car moves in positive y - direction with velocity v proportional to distance travelled y as $v(y) \propto y^{\beta}$, where β is a positive constant. The car moves a distance L with average velocity $< v >$ proportional to L as $< v > \propto L^{1/3}$. The constant β is given as

A) $\frac{1}{4}$

B) $\frac{1}{3}$

C) $\frac{2}{3}$

D) $\frac{1}{2}$

79. Q.Id: 161347

A gas satisfies the relation $pV^{5/3} = k$, where p is pressure, V is volume and k is constant. The dimension of constant k are

A) $[ML^4T^{-2}]$

B) $[ML^2T^{-2}]$

C) $[ML^6T^{-2}]$

D) $[MLT^{-2}]$

80. Q.Id: 161346

Assertion (A) : When we bounce a ball on the ground, it comes to rest after a few bounces, losing all its energy. This is an example of violation of conservation of energy.

Reason (R) : energy can change from one form to another but the total energy is always conserved.

Which of the following is true ?

A) Both (A) and (R) are true and (R) is the correct explanation of (A)

B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

C) (A) is true but (R) is false

D) (R) is true but (A) is false

81. Q.Id: 161339

At any point on a curve, the slope of the tangent is equal to the sum of abscissa and the product of ordinate and abscissa of that point. If the curve passes through (0, 1) then the equation of the curve is :

A) $y = 2e^{\frac{x^2}{2}} - 1$

B) $y = 2e^{x^2}$

C) $y = e^{-x^2}$

D) $y = 2e^{-x^2} - 1$

82. Q.Id: 161338

The general solution of the differential equation $(x^2 + xy)y' = y^2$ **is**

A) $e^{\frac{y}{2}} = cx$

B) $e^{-\frac{y}{2}} = cy$

C) $e^{-\frac{y}{2}} = cxy$

D) $e^{\frac{-2y}{2}} = cy$

83. Q.Id: 161334

The differential equation corresponding to the family of circles having centres on X - axis and passing through the origin is

A) $y^2 + x^2 + \frac{dy}{dx} = 0$

B) $y^2 - x^2 + \frac{dy}{dx} = 0$

C) $y^2 + x^2 + 2xy\frac{dy}{dx} = 0$

D) $y^2 - x^2 - 2xy\frac{dy}{dx} = 0$

84. Q.Id: 161331

The area enclosed (in square units) by the curve $y = x^4 - x^2$, the X - axis and the vertical lines passing through the two minimum points of the curve is

A) $\frac{48\sqrt{2}}{5}$

B) $\frac{5}{48\sqrt{2}}$

C) $\frac{7}{60\sqrt{2}}$

D) $\frac{7}{30\sqrt{2}}$

85. Q.Id: 161268

$\int_0^3 (2 + x^2)\, dx =$

A) $\lim_{n\to\infty} \frac{1}{n}\left[2n + \frac{1^2+2^2+\ldots+(3n)^2}{n^2}\right]$

B) $\lim_{n\to\infty} \frac{1}{n}\left[3n + \frac{1^2+2^2+\ldots+6n^2}{n^2}\right]$

C) $\lim_{n\to\infty} \frac{1}{n}\left[6n + \frac{1^2+2^2+\ldots+9n^2}{n^2}\right]$

D) $\lim_{n\to\infty} \frac{1}{n}\left[3n + \frac{1^2+2^2+\ldots+3n^2}{n^2}\right]$

86. Q.Id: 161263

$\int_0^{\frac{\pi}{2}} \frac{\cos^3 x}{\sin x + \cos x}\, dx =$

A) $\frac{\pi - 1}{2}$

B) $\frac{\pi - 1}{4}$

C) $\frac{1 + \pi}{4}$

D) $\frac{\pi - 3}{4}$

87. Q.Id: 161254

If $\int \frac{x}{(x^2+1)(x-1)}\, dx = A \log|x^2+1| + B \tan^{-1} x + C \log|x-1| + d$ **, then** $A + B + C =$

A) $\frac{1}{4}$

B) $\frac{1}{2}$

C) $\frac{3}{4}$

D) $\frac{5}{4}$

88. Q.Id: 161247

$\int_0^{\frac{\pi}{2}} \frac{dx}{1 + (\tan x)^{\sqrt{2018}}} =$

A) π

B) $\frac{3\pi}{4}$

C) $\frac{\pi}{2}$

D) $\frac{\pi}{4}$

89. Q.Id: 161246

$$\int \frac{dx}{(e^x+e^{-x})^2} =$$

A) $\frac{1}{2(e^{2x}+1)}+c$

B) $-\frac{1}{2(e^{2x}+1)}+c$

C) $\frac{1}{3(e^{2x}+1)}+c$

D) $-\frac{1}{(e^{2x}+1)}+c$

90. Q.Id: 161245

The height of a cylinder of the greatest volume that can be inscribed in a sphere of radius 3 is

A) $3\sqrt{3}$

B) $2\sqrt{3}$

C) $\sqrt{3}$

D) $\sqrt{2}$

91. Q.Id: 161244

If (α, β) **and** (γ, δ) **where** $\alpha < \gamma$**, are the turning points of** $f(x) = 2x^3 - 15x^2 + 36x - 8$**, then** $\alpha - \gamma - \beta + \delta =$

A) 0

B) -2

C) 2

D) 1

92. Q.Id: 161243

Let $f(x)$ **be continuous on** $[0, 6]$ **and differentiable on** $(0, 6)$**. Let** $f(0) = 12$ **and** $f(6) = -4$**. If** $g(x) = \frac{f(x)}{x+1}$**, then for some Lagrange's constant** $c \in (0, 6)$, $g'(c) =$

A) $-\frac{44}{3}$

B) $-\frac{22}{21}$

C) $\frac{32}{21}$

D) $-\frac{44}{21}$

93. Q.Id: 161242

The normal at a point θ **to the curve** $x = a(1+\cos\theta),\ y = a\sin\theta$ **always passes through the fixed point**

A) $(0, a)$

B) $(2a, 0)$

C) $(a, 0)$

D) (a, a)

94. Q.Id: 161241

If the relative errors in the base radius and the height of a cone are same and equal to 0.02, then the percentage error in the volume of that cone is

A) 2 **B)** 4

C) 6 **D)** 8

95. Q.Id: 161240

If $y=\frac{(\sin^{-1}x)^2}{2}$ **, then** $(1-x^2)y_2-xy_1=$

A) y **B)** 2y

C) 1 **D)** 2

96. Q.Id: 161239

Match the items given in List - I with those of the items of List - II

List1	**List2**
A. If $y=\|x\|+\|x-2\|$ then at $x=2, \frac{dy}{dx}=$	I. 2
B. If $f(x)=\|\cos 2x\|$, then $f'\left(\frac{\pi'}{4}\right)=$	II. 0
C. If $f(x)=\sin \pi[x]$ where [.] denotes the greatest integer function, then $f'(-1)=$	III. -2
D. If $f(x)=\log\|x-1\|, x\neq 1$ then $f'\left(\frac{1}{2}\right)=$	IV. Does not exist
E. .	V. $\frac{1}{2}$

A) A - V, B - III, C - I, D - II **B)** A - IV, B - II, C - I, D - III

C) A - IV, B - I, C - II, D - III **D)** A - I, B - III, C - IV, D - II

97. Q.Id: 161238

$$f(x)=\begin{cases}\dfrac{x^2\log(\cos x)}{\log(1+x^2)}, & x\neq 0\\ 0, & x=0\end{cases}$$

If , **then f is**

A) Discontinuous at zero

B) Continuous but not differentiable at zero

C) differentiable at zero

D) not Continuous but not differentiable at zero

98. Q.Id: 161237

$$f(x)=\begin{cases}\dfrac{x-2}{|x-2|}+a, & x<2\\ a+b, & x=2\\ \dfrac{x-2}{|x-2|}+b, & x>2\end{cases}$$

If **is continuous at** $x=2$**, then** $a+b=$

A) 2

B) 1

C) 0

D) -1

99. Q.Id: 161236

$$\lim_{x\to\infty}\frac{3|x|-x}{|x|-2x}-\lim_{x\to 0}\frac{\log(1+x^3)}{\sin^3 x}=$$

A) 1

B) $\frac{1}{3}$

C) $\frac{4}{3}$

D) 0

100. Q.Id: 161235

If the plane passing through the points (1, 2, 3), (2, 3, 1) and (3, 1,2) is $ax+by+cz=1$ **then** $a+2b+3c=$

A) 0

B) 1

C) 6

D) 18

101. Q.Id: 161234

The lines whose direction cosines are given by the relations $al+bm+cn=0$ **and** $mn+nl+lm=0$ **are**

A) Perpendicular if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

B) Perpendicular if $\sqrt{a}+\sqrt{b}+\sqrt{c}=0$

C) Parallel if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

D) Parallel to $a+b+c=0$

102. Q.Id: 161233

Assertion (A) : If $(-1, 3, 2)$ **and** $(5, 3, 2)$ **are respectively the ortho centre and circumcentre of a triangle then** $(3, 3, 2)$ **is its centroid**

Reason (R) :Centroid of the triangle divides the line segment joining the ortho centre and the circumcentre in the ration 1 : 2

Which of the following is true ?

A) (A) and (R) are true and (R) is the correct explanation to (A)

B) (A) and (R) are true but (R) is not the correct explanation to (A)

C) (A) is true and (R) is false

D) (A) is False and (R) is true

103. Q.Id: 161232

If the eccentricity of a conic satisfiesthe equation $2x^3 + 10x - 13 = 0$**, then that conic is**

A) A circle

B) A Parabola

C) An Ellipse

D) A Hyperbola

104. Q.Id: 161231

A variable tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ **makes intercepts on both the axes. The locus of the middle point of the portion of the tangent between the coordinate axes is**

A) $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

B) $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 1$

C) $b^2x^2 + a^2y^2 = 4$

D) $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 4$

105. Q.Id: 161230

If the normal drawn at one end of the latus rectum of the ellipse $b^2x^2 + a^2y^2 = a^2b^2$ **with eccentricity 'e' passes through one end of the minor axis. Then,**

A) $e^4 + e^2 = 2$

B) $e^4 - e^2 = 1$

C) $e^4 + e^2 = 1$

D) $e^2 + e = 1$

106. Q.Id: 161221

Three normals are drawn from the point (c, 0) to the curve $y^2 = x$. If one of the normals is X - axis, then the value of c for which the other two normals are perpendicular to each other is

A) $\frac{1}{4}$

B) $\frac{1}{2}$

C) $\frac{3}{4}$

D) $\frac{5}{8}$

107. Q.Id: 161220

If two tangents to the parabola $y^2 = 8x$ meet the tangent at its vertex in M and N such that MN = 4, then the locus of the point of intersection of those two tangents is

A) $y^2 = 8(x+3)$

B) $y^2 = 8(x-2)$

C) $y^2 = 8(x+2)$

D) $y^2 = 4(x+2)$

108. Q.Id: 161219

The equation of the tangent at the point (0, 3) on the circle which cuts the circles $x^2+y^2-2x+6y=0, x^2+y^2-4x-2y+6=0$ and $x^2+y^2-12x+2y+3=0$ orthogonally is

A) $y=3$

B) $x=0$

C) $3x+y-3=0$

D) $x+3y-9=0$

109. Q.Id: 161218

The centre of the circle passing through the point (1, 0) and cutting the circles $x^2+y^2-2x+4y+1=0$ and $x^2+y^2+6x-2y+1=0$ orthogonally is

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

B) $\left(\frac{1}{2}, \frac{1}{2}\right)$

C) $(0, 1)$

D) $(0, 0)$

110. Q.Id: 161217

If the circles given by $S \equiv x^2+y^2-14x+6y+33=0$ and $S' \equiv x^2+y^2-a^2=0$ $(a \in N)$ have 4 common tangents, then the possible number of circles $S'=0$ is

A) 1

B) 2

C) 0

D) Infinite

111. Q.Id: 161216

If $y+c=0$ is a tangent to the circle $x^2+y^2-6x-2y+1=0$ at $(a, 4)$ then

A) $ac=360$

B) $ac=-12$

C) $a+c=0$

D) $4a=c$

112. Q.Id: 161189

If the chord $L\equiv y-mx-1=0$ of the circle $S\equiv x^2+y^2-1=0$ touches the circle $S_1\equiv x^2+y^2-4x+1=0$, then the possible points for which $L=0$ is a chord of contact of $S=0$ are

A) $(2\pm\sqrt{6}, 0)$

B) $(2\pm\sqrt{6}, 1)$

C) $(2, 0)$

D) $(\sqrt{6}, 1)$

113. Q.Id: 161185

If the pair of lines $6x^2+xy-y^2=0$ and $3x^2-axy-y^2=0, a>0$ have a common line then $a=$

A) $\frac{1}{2}$

B) 1

C) 2

D) 4

114. Q.Id: 161184

A pair of straight lines is passing through the point (1, 1). One of the lines makes an angle θ with the positive direction of X-axis and the other makes the same angle with the positive direction of Y-axis. If the equation of the pair of straight lines is $x^2+(a+2)xy+y^2+a(x+y-1)=0, a\neq -2$ then the value of θ is

A) $\frac{1}{2}\sin^{-1}\left(\frac{2}{a+2}\right)$

B) $\frac{1}{2}\sin\left(\frac{2}{a+2}\right)$

C) $\frac{1}{2}\tan^{-1}\left(\frac{2}{a+2}\right)$

D) $\frac{1}{2}\tan\left(\frac{2}{a+2}\right)$

115. Q.Id: 161183

The equation of the straight line in the normal form which is parallel to the lines, $x+2y+3=0$ and $x+2y+8=0$ and dividing the distance between these two lines in the ratio 1 : 2 internally is

A) $x\cos\alpha+y\sin\alpha=\frac{10}{\sqrt{45}}$, $\alpha=\tan^{-1}\sqrt{2}$

B) $x\cos\alpha+y\sin\alpha=\frac{14}{\sqrt{45}}$, $\alpha=\pi+\tan^{-1}2$

C) $x\cos\alpha+y\sin\alpha=\frac{14}{\sqrt{45}}$, $\alpha=\tan^{-1}2$

D) $x\cos\alpha+y\sin\alpha=\frac{10}{\sqrt{45}}$, $\alpha=\pi+\tan^{-1}\sqrt{2}$

116. Q.Id: 161182

The incentre of the triangle formed by the straight line having 3 as X - intercept and 4 as Y - intercept, together with the coordinate axes is

A) $(2,2)$

B) $\left(\frac{3}{2},\frac{3}{2}\right)$

C) $(1,2)$

D) $(1,1)$

117. Q.Id: 161181

Let $a\neq0, b\neq0, c$ **be three real numbers and** $L(p,q)=\frac{ap+bq+c}{\sqrt{a^2+b^2}},\ \forall p,q\in R$ **. If** $L\left(\frac{2}{3},\frac{1}{3}\right)+L\left(\frac{1}{3},\frac{2}{3}\right)+L(2,2)=0$ **, then the line** $ax+by+c=0$ **always passes through the fixed point**

A) $(0,1)$

B) $(1,1)$

C) $(2,2)$

D) $(-1,-1)$

118. Q.Id: 161180

By rotating the coordinate axes in the positive direction about the origin by an angle α**, if the point (1, 2) is transformed to** $\left(\frac{3\sqrt{3}-1}{2\sqrt{2}},\frac{\sqrt{3}+3}{2\sqrt{2}}\right)$ **in new coordinate system. Then** $\alpha=$

A) $\frac{\pi}{3}$

B) $\frac{\pi}{6}$

C) $\frac{\pi}{9}$

D) $\frac{\pi}{12}$

119. Q.Id: 161179

A quadrilateral ABCD is divided by the diagonal AC into two triangles of equal areas. If A, B, C, D are respectively, $(3, 4), (-3, 6), (-5, 1)$ **then the locus of D is :**

A) $(x-8y-57)(x-8y+11)=0$

B) $(x-8y-57)(x-8y-11)=0$

C) $(3x-8y-57)(3x-8y+11)=0$

D) $(3x-8y-11)(3x-8y+57)=0$

120. Q.Id: 161178

An executive in a company makes on an average 5 telephone calls per hour at a cost of 2 rupee per call. The Probability that in any hour the cost of the calls exercise a sum of 4 rupee is

A) $\frac{2e^4-35}{2e^5}$

B) $\frac{2e^5-37}{2e^5}$

C) $1-\frac{37}{e^4}$

D) $1-(18.5)e^5$

121. Q.Id: 161177

A random variables X takes the value 1, 2, 3 and 4 such that $2P(X=1)=3P(X=2)=P(X=3)=5P(X=4)$**. If** σ^2 **is the variance and** μ **is the mean of X. Then,** $\sigma^2+\mu^2=$

A) $\frac{421}{61}$

B) $\frac{570}{61}$

C) $\frac{149}{61}$

D) $\frac{3480}{3721}$

122. Q.Id: 161176

A company produces 10000 items per day. On a particular day 2500 items were produced on machine A, 3500 on machine B and 4000 on machine C. The probability that an item produced by the machines A, B, C to be defective is respectively 2%, 3% and 5%. If one item is selected at random from the output and is found to be defective, then the probability that it was produced machine C, is

A) $\frac{10}{71}$

B) $\frac{16}{71}$

C) $\frac{40}{71}$

D) $\frac{21}{71}$

123. Q.Id: 161175

5 persons entered a lift cabin on the ground floor of a 7 floor house. Suppose, that each of them independently and with equal probability can leave the cabin at any floor beginning with the first. The probability of all the 5 persons leaving the cabin at different floors is

A) $\frac{360}{2401}$

B) $\frac{5}{54}$

C) $\frac{5}{18}$

D) $\frac{5!}{7!}$

124. Q.Id: 161174

Two disc are thrown and two coins are tossed simultaneously. The Probability of getting prime numbers on both the disc along with a head and a tail on the two coins is

A) $\frac{1}{8}$

B) $\frac{1}{2}$

C) $\frac{3}{16}$

D) $\frac{1}{4}$

125. Q.Id: 161173

The variance of 50 observations is 7. If each observation is multiplied by 6 and then 5 is subtracted from it, then the variance of the new data is

A) 37

B) 42

C) 247

D) 252

126. Q.Id: 161172

$x_1, x_2, \ldots, x_n$ are n observations with mean $\bar{x}$ and standard deviation σ. Match the items of List - I with those of List - II

List1	List2
A. $\sum_{i=1}^{n}(x_i-\bar{x})$	I. Median
B. Variance(σ^2)	II. Coefficient of variation
C. Mean deviation	III. Zero
D. Measure used to find the homogeneity of given two series	IV. Mean of the absolute deviations from any measure of central tendency
E. -	V. Mean of the squares of the deviations from mean

A) A - I, B - V, C - II, D - III

B) A - I, B - IV, C - III, D - II

C) A - III, B - V, C - IV, D - II

D) A - III, B - V, C - II, D - I

127. Q.Id: 161149

If the vectors b, c, d are not coplanar, then the vectors $(a\times b)\times(c\times d)+(a\times c)+(d\times b)+(a\times d)\times(b\times c)$ is

A) Parallel to a

B) Parallel to b

C) Parallel to c

D) Perpendicular to a

128. Q.Id: 161148

The volume of a tetrahedron whose vertices are $4\hat{i}+5\hat{j}+\hat{k}$, $-\hat{j}+\hat{k}$, $3\hat{i}+9\hat{j}+4\hat{k}$ and $-2\hat{i}+4\hat{j}+4\hat{k}$ is (in cubic units)

A) $\frac{14}{3}$

B) 5

C) 6

D) 30

129. Q.Id: 161147

If the position vectors of three points A, B, C respectively are $\hat{i}+2\hat{j}+\hat{k}$, $2\hat{i}-\hat{j}+2\hat{k}$ and $\hat{i}+\hat{j}+2\hat{k}$, then the perpendicular distance of the point C from the line AB is

A) $\sqrt{\frac{3}{11}}$

B) $\sqrt{\frac{4}{11}}$

C) $\sqrt{\frac{6}{11}}$

D) $\sqrt{\frac{8}{11}}$

130. Q.Id: 161146

A line L is passing through the point A whose position vector is $\hat{i}+2\hat{j}-3\hat{k}$ and parallel to the vector $2\hat{i}+\hat{j}+2\hat{k}$. A plane π is passing through the points $\hat{i}+\hat{j}+\hat{k}$, $\hat{i}-\hat{j}-\hat{k}$ and parallel to the vector $\hat{i}-2\hat{j}$. then, the point where this plane π meets the line L is

A) $\frac{1}{3}(-7\hat{i}+\hat{j}-19\hat{k})$

B) $7\hat{i}+\hat{j}-19\hat{k}$

C) $3\hat{i}+3\hat{j}-\hat{k}$

D) $2\hat{i}-\hat{j}+\hat{k}$

131. Q.Id: 161145

The vector that is parallel to the vector $2\hat{i}-2\hat{j}-4\hat{k}$ and coplanar with the vectors $\hat{i}+\hat{j}$ and $\hat{j}+\hat{k}$ is

A) $\hat{i}-\hat{k}$

B) $\hat{i}+\hat{j}-\hat{k}$

C) $\hat{i}-\hat{j}-2\hat{k}$

D) $3\hat{i}+3\hat{j}+6\hat{k}$

132. Q.Id: 161144

Let $3\hat{i}+\hat{j}-\hat{k}$ be the position vector of a point B. Let A be a point on the line which is passing through B and parallel to the vector $2\hat{i}-\hat{j}+2\hat{k}$. If $|BA| = 18$, then the position vector of A is

A) $-9\hat{i}+7\hat{j}-13\hat{k}$

B) $-9\hat{i}+3\hat{j}+12\hat{k}$

C) $9\hat{i}-3\hat{j}+2\hat{k}$

D) $3\hat{i}-\hat{j}+7\hat{k}$

133. Q.Id: 161143

In ΔABC, right angled at A, the circumradius, in radius and radius of the excircle opposite to A are respectively in the ratio $2:5:\lambda$, then the roots of the equation $x^2-(\lambda-5)x+(\lambda-6)=0$ are

A) 3, 4

B) 5, 13

C) 1, 3

D) 8, 13

134. Q.Id: 161142

In ΔABC**, if** $A = 2B$ **and the sides opposite to the angles A, B, C are** $\alpha+1, \alpha-1$ **and** α **respectively, then** $\alpha =$

A) 3 **B)** 4

C) 5 **D)** 6

135. Q.Id: 161141

In ΔABC**, if** $a = 5$ **and** $\tan\frac{A-B}{2} = \frac{1}{4}\tan\frac{A+B}{2}$**, then** $\sqrt{a^2-b^2} =$

A) 2 **B)** 3

C) 4 **D)** 5

136. Q.Id: 161140

If $\cosh x = \frac{\sqrt{14}}{3}$, $\sinh x = \cos\theta$ **and** $-\pi < \theta < -\frac{\pi}{2}$**, then** $\sin\theta =$

A) $\frac{1}{3}$ **B)** $\frac{2}{3}$

C) $-\frac{1}{3}$ **D)** $-\frac{2}{3}$

137. Q.Id: 161138

$2\tan^{-1}\frac{1}{5} + \sec^{-1}\frac{5\sqrt{2}}{7} + 2\tan^{-1}\frac{1}{8} =$

A) $\frac{\pi}{6}$ **B)** $\frac{\pi}{4}$

C) $\frac{\pi}{3}$ **D)** $\frac{\pi}{8}$

138. Q.Id: 161131

Number of solutions of the equation $\sin x - \sin 2x + \sin 3x = 2\cos^2 x - 2\cos x$ **in** $(0, \pi)$ **is**

A) 1 **B)** 3

C) 2 **D)** 4

139. Q.Id: 161124

If $x = \sum_{n=0}^{\infty}\cos^{2n}\theta$, $y = \sum_{n=0}^{\infty}\sin^{2n}\theta$, $z = \sum_{n=0}^{\infty}\cos^{2n}\theta\sin^{2n}\theta$ **and** $0 < \theta < \frac{\pi}{2}$**, then**

A) $xz + yz = xy + z$ **B)** $xyz = yz + x$

C) $xy + z = xy + zx$ **D)** $x + y + z = xyz + z$

140. Q.Id: 161123

When $\frac{\sin 9\theta}{\cos 27\theta}+\frac{\sin 3\theta}{\cos 9\theta}+\frac{\sin 9\theta}{\cos 3\theta}=k$, $(\tan 27\theta-\tan\theta)$ **is defined, then** $k=$

A) $\frac{\pi}{2}$

B) $-\frac{1}{2}$

C) $\frac{1}{2}$

D) $\frac{\pi}{4}$

141. Q.Id: 161122

If $A(n)=\sin^n\alpha+\cos^n\alpha$, **then** $A(1)\,A(4)+A(2)\,A(5)=$

A) $A(1)\,A(2)+A(4)\,A(5)$

B) $A(1)\,A(6)+A(2)\,A(3)$

C) $A(1)\,A(3)+A(2)\,A(6)$

D) $A(1)\,A(2)+A(3)\,A(6)$

142. Q.Id: 161121

If $\frac{x^4+x^3+2x^2-2x+1}{x^3+x^2}=P(x)+\frac{A}{x}+\frac{B}{x^2}+\frac{C}{x+1}$, **then** $A+B+C=$

A) $P(0)$

B) $P(2)$

C) $P(3)$

D) $P(4)$

143. Q.Id: 161120

For $m\in N$, **in the expansion of** $\left(\sqrt[4]{x^{-3}}+a\sqrt[4]{x^5}\right)^n$, **the sum of all binomial coefficients lies between 200 and 400 and the term independent of x is 448. Then, the value of a is**

A) 1

B) 2

C) $\frac{1}{2}$

D) 0

144. Q.Id: 161119

if the coefficient of x^5 **in the expansion of** $\left(ax^2+\frac{1}{bx}\right)^{13}$ **is equal to the coefficient of** x^{-5} **in the expansion of** $\left(ax-\frac{1}{bx^2}\right)^{13}$, **then** $ab=$

A) 1

B) $\frac{1}{6}$

C) $\frac{7}{6}$

D) $\frac{4}{2}$

145. Q.Id: 161118

If a is the number of all even divisors and b is the number of all odd divisors of the number 10800, then $2a+3b=$

A) 72 **B)** 132

C) 96 **D)** 136

146. Q.Id: 161117

If all possible numbers are formed by using the digits 1, 2, 3, 5, 7 without repetition and they are arranged in descending order, then the rank of the number 327 is

A) 31 **B)** 175

C) 149 **D)** 271

147. Q.Id: 161116

The equation $x^5-5x^3+5x^2-1=0$ **has three equal roots. If** α, β **are the other roots two roots of this equation, then** $\alpha+\beta+\alpha\beta=$

A) -4 **B)** 3

C) -2 **D)** -5

148. Q.Id: 161115

If the roots of the equation $\sqrt{\frac{x}{1-x}}+\sqrt{\frac{1-x}{x}}=\frac{5}{2}$ **are p and** $q(p>q)$ **and the roots of the equation** $(p+q)x^4-pqx^2+\frac{p}{q}=0$ **are** $\alpha, \beta, \gamma, \delta$ **then** $\left(\sum\alpha\right)^2-\sum\alpha\beta+\alpha\beta\gamma\delta=$

A) 0 **B)** $\frac{104}{25}$

C) $\frac{25}{4}$ **D)** $\frac{16}{5}$

149. Q.Id: 161114

If the roots of the equation $x^2+x+a=0$ **exceeds a, then**

A) $a>2$ **B)** $a<-2$

C) $2<a<3$ **D)** $-2<a<-1$

150. Q.Id: 161113

The set of real values of x for which the inequality $|x-1|+|x+1|<4$ always holds good is

A) $(-2, 2)$

B) $(-\infty, -2)\cup(2, \infty)$

C) $(-\infty, -1]\cup[1, \infty)$

D) $(-\infty, 1]\cup(1, 2)$

151. Q.Id: 161110

If $2 \text{ cis } \frac{7\pi}{5}$ **is one of the values of** $z^{1/5}$**, then** $z =$

A) $32+32i$

B) -32

C) -1

D) 32

152. Q.Id: 161107

When $n = 8$, $(\sqrt{3}+i)^n+(\sqrt{3}-i)^n =$

A) -256

B) -128

C) $256\ i$

D) $128\ i$

153. Q.Id: 161102

The points in the Argand plane given by $Z_1 = -3+5i,\ Z_2 = -1+6i,\ Z_3 = -2+8i,\ Z_4 = -4+7i$ **form a**

A) Parallelogram

B) Rectangle

C) Rhombus

D) Square

154. Q.Id: 161097

Z is a complex number such that $|Z| \le 2$ **and** $-\frac{\pi}{3} \le \text{amp } Z \le \frac{\pi}{3}$ **. The area of the region formed by locus of Z is**

A) $\frac{2\pi}{3}$

B) $\frac{\pi}{3}$

C) $\frac{4\pi}{3}$

D) $\frac{8\pi}{3}$

155. Q.Id: 161096

The following system of equations $x+y+z=9,\ 2x+5y+7z=52$ **and** $x+7y+11z=77$ **has**

A) No solution

B) Exactly 2 Solution

C) Only one Solution

D) Infinitely many solutions

156. Q.Id: 161095

Let $l, m, n \in R$ and $A = \begin{bmatrix} 1 & r & r^2 & l \\ r & r^2 & 1 & m \\ r^2 & 1 & r & n \end{bmatrix}$ then the set of all real values of r for which the rank of A is 3, is

A) $(0, \infty)$

B) R

C) $R-\{1\}$

D) $R-\{0\}$

157. Q.Id: 161094

Let $A = \begin{bmatrix} \frac{1}{6} & \frac{-1}{3} & \frac{-1}{6} \\ \frac{-1}{3} & \frac{2}{3} & \frac{1}{3} \\ \frac{-1}{6} & \frac{1}{3} & \frac{1}{6} \end{bmatrix}$. If $A^{2016\,l} + A^{2017\,m} + A^{2018\,n} = \frac{1}{\alpha}A$, For every $l, m, n \in N$, then the value of α is :

A) $\frac{1}{6}$

B) $\frac{1}{3}$

C) $\frac{1}{2}$

D) $\frac{2}{3}$

158. Q.Id: 161093

If α and β are the greatest divisions of $n(n^2-1)$ and $2n(n^2+2)$ respectively for all $n \in N$, then $\alpha\beta =$

A) 18

B) 36

C) 27

D) 9

159. Q.Id: 161091

If $f:[1, \infty) \to [1, \infty]$ is defined by $f(x) = \frac{1+\sqrt{1+4\log_2 x}}{2}$, then $f^{-1}(3) =$

A) 0

B) 1

C) 64

D) $\frac{1+\sqrt{5}}{2}$

160. Q.Id: 161086

Let $f:R \to R,\ g:R \to R$ **be differentiable functions such that** $(fog)(x) = x$**. If** $f(x) = 2x + \cos x + \sin^2 x$**, then the value of** $\sum_{n=1}^{99} g(1 + (2n-1)\pi)$ **is**

A) $1250\ \pi$

B) $(99)^2 \frac{\pi}{2}$

C) $(99)^2\ \pi$

D) $2500\ \pi$