Previous Paper Questions

1. Q.Id: 159542

In a ΔABC, let a, b, c , s, r, R, I, S r_1, r_2, r_3 stand for their usual meaning. Then match the items of List - I with those of the items of List - II

List1	List2
A. $\tan\frac{A}{2}=\frac{r}{s-a}$	I. $Al\left(\sqrt{\frac{(s-b)(s-c)}{bc}}\right)$
B. r	II. R^2
C. $(SI)^2+2Rr$	III. $(4R+r+\sqrt{2}s)(4R+r-\sqrt{2}s)$
D. $r_1^2+r_2^2+r_3^2$	IV. $\frac{Rr}{S}$
E. .	V. $\frac{(s-b)(s-c)}{\Delta}$

A) A-> I, B-> V, C-> IV, D-> III

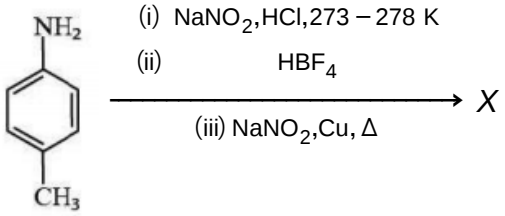
B) A-> V, B-> I, C-> II, D-> III

C) A-> V, B-> I, C-> IV, D-> III

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

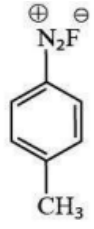
2. Q.Id: 155310

Identify X in the following.



A) 

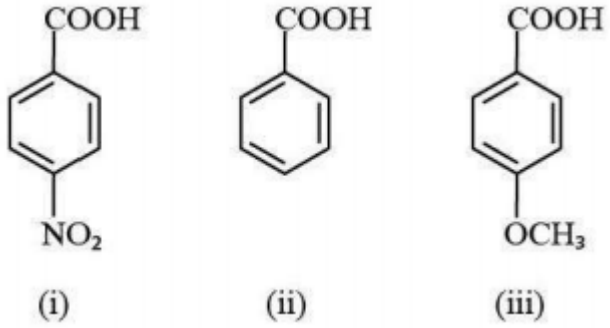
B) 

C) 

D) 

3. Q.Id: 155309

Identify the correct decreasing order of acidic strength.



A) (iii)>(ii)>(i)

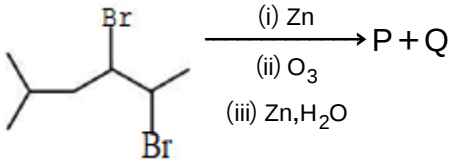
B) (i)>(ii)>(iii)

C) (ii)>(iii)>(i)

D) (i)>(iii)>(ii)

4. Q.Id: 155308

The major products P and Q in the following reaction sequences are



A) P Q
3-Methy1pentanol Ethanol

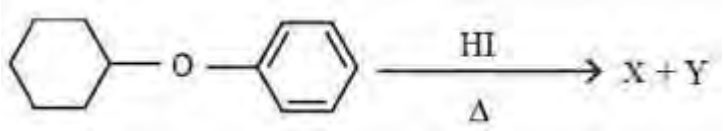
B) P Q
3-Methy1pentanal Ethanal

C) P Q
3-Methy1butanol Ethanol

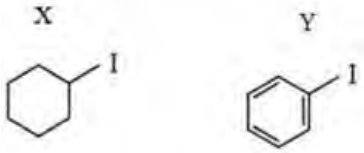
D) P Q
3-Methy1butanal Ethanal

5. Q.Id: 155307

What are X and Y in the following reaction?

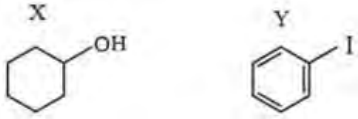


A) X Y



B) X Y

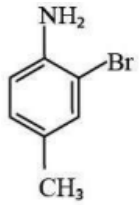
C) X Y

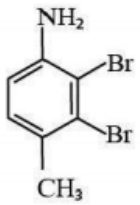


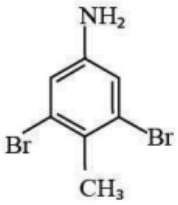
D) X Y

6. Q.Id: 155306

4-Nitro toluene(para-nitro toluene) on reduction with Fe/HCl and then electrophilic bromination with an excess amount of Br_2 gives

A) 

B) 

C) 

D) 

7. Q.Id: 155305

The number of six and five membered rings present in norethindrone (a synthetic progesterone) are respectively

A) 2 and 2

B) 3 and 1

C) 3 and 3

D) 3 and 2

8. Q.Id: 155304

Which of the following are reducing sugars?

I) Sucrose

II) Ribose

III) Lactose

IV) Fructose

A) I, II only

B) II, III, IV Only

C) II, III only

D) I, II, IV only

9. Q.Id: 155303

Type of reaction involved in the initial step in the formation of Bakelite

A) Electrophilic substitution

B) Electrophilic addition

C) Nucleophilic substitution

D) Nucleophilic addition

10. Q.Id: 155302

Coordination number of Fe in the complexes $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$ and $[FeCl_4]^{-}$ would be respectively

A) 2,3,3

B) 6,6,4

C) 6,3,3

D) 6,4,6

11. Q.Id: 155301

What is the oxidation state of Cr, when the pH of the aqueous solution of potassium dichromate changes from acidic to basic?

A) +5

B) +4

C) +6

D) +3

12. Q.Id: 155300

Ozone is obtained from oxygen

A) By oxidation at high temperature

B) By oxidation using a catalyst

C) By silent electric discharge

D) By conversion at high pressure

13. Q.Id: 155299

How many bridging oxygen atoms are present in P_4O_{10} **?**

A) 4

B) 5

C) 6

D) 2

14. Q.Id: 155298

The solubilities of the impurities in the melt and solid states is not same. This principle is applied during the extraction of boron. This method is known as

A) Poling

B) Zone refining

C) Liquation

D) van Arkel's method

15. Q.Id: 155297

The method which is based on the principle that "different components of a mixture are differently adsorbed on an adsorbent" is called

A) Zone refining method

B) Vapour phase refining method

C) Liquation method

D) Chromatographic method

16. Q.Id: 155296

For a first order reaction (A $\rightarrow$ **B), the temperature (T) dependent rate constant (k) in** $\sec^{-1}$ **was found to follow the equation: log k =** $\left(-\frac{20}{T}\right)+4$ **The activation energy** (E_a) **and pre-exponential factor (A) respectively, ate**

A) $46.06\ \text{cal mol}^{-1}$ and 10^{-4}s^{-1}

B) $92.12\ \text{cal mol}^{-1}$ and 10^{4}s^{-1}

C) $46.06\ \text{cal mol}^{-1}$ and 10^{4}s^{-1}

D) $9.212\ \text{cal mol}^{-1}$ and 10^{-4}s^{-1}

17. Q.Id: 155295

What is the standard cell potential forthe reaction K=1 (equilibrium constant)

A) One

B) Zero

C) 2.303

D) Infinity

18. Q.Id: 155294

The vapour pressure of pure water is 23 mm Hg. The vapour pressure of an aqueous solution which contains 10 mass percent of solute 'A' having molecular weight 50 is

A) 0.003 atm

B) 34.5 atm

C) 22 atm

D) 0.028 atm

19. Q.Id: 155293

15% aqueous solution of glucose (molecular weight = 180 g/mol) is isotonic with 8% aqueous solution containing an unknown non-dissociable solute. What is the molecular weight of the unknown solute?

A) 108

B) 96

C) 84

D) 9.6

20. Q.Id: 155292

The angle between (100) and (110) planes of FCClattice is

A) 90^0

B) 0^0

C) 45^0

D) 120^0

21. Q.Id: 155291

The correct order of reactivity of hydrogen lhalides with propene is

A) HCl>HBr>HI

B) HBr>HI>HCl

C) HI>HBr>HCl

D) HCl>HI>HBr

22. Q.Id: 155290

Which of the following sets of functioned groups is meta-directing group?

A) $-NO_2, -NH_2, -COOH, -COOR$

B) $-NO_2, -CHO, -SO_3H, -COR$

C) $-CN, -CHO, -NHCOCH_3, -COOR$

D) $-CN, -NH_2, -NHR-OCH_3$

23. Q.Id: 155289

The correct order of the relative stability of the following carbanionsis

(*i*) $HC \equiv C^-$ (ii) $CH_2 = CH - CH_2^-$ (iii) $H_2C = CH^-$ (iv) $(C_6H_5)_2\,CH^-$

A) (i)> (iv) > (ii)>(iii)

B) (iii)> (iv) > (i)>(ii)

C) (iv)> (ii) > (i)>(iii)

D) (iv)> (i) > (ii)>(iii)

24. Q.Id: 155288

Which of the following molecules is present in photochemical smog?

A) SO_2

B) NO_2

C) CO_2

D) CO

25. Q.Id: 155287

When graphite is heated at 300 °C with potassium vapour, it forms C_8K compound that shows one of the following property.

A) Conducting and diamagnetic

B) Non-conducting and diamagnetic

C) Conducting and paramagnetic

D) Non-conducting and paramagnetic

26. Q.Id: 155286

When orthoboric acid(H_3BO_3) is subjected to strong heating,the residue left is

A) Diborane

B) Boron

C) Boric anhydride

D) Borax

27. Q.Id: 155285

What is the increasing order of hydration enthalpies of alkali metal ions ?

A) $Rb^+ < Cs^+ < K^+ < Na^+ < Li^+$

B) $Cs^+ < Rb^+ < K^+ < Li^+ < Na^+$

C) $Cs^+ < Rb^+ < K^+ < Na^+ < Li^+$

D) $Cs^+ < Rb^+ < Na^+ < K^+ < Li^+$

28. Q.Id: 155284

What will be the organic compound formed when, aluminium carbide react with deuterated water?

A) CD_3OD

B) DCOOD

C) CD_4

D) $D_3C-O-CD_3$

29. Q.Id: 155283

Decreasing order of number of ionisable hydrogen atoms in the following molecules is

(i) H_3PO_4 (ii) H_3PO_3 (iii) H_3PO_2 (iv) $H_4P_2O_6$

A) (ii) > (iv) > (i) > (iii)

B) (iv) > (iii) > (ii) > (i)

C) (iv) > (i) > (ii) > (iii)

D) (ii) > (iv) > (iii) > (i)

30. Q.Id: 155282

What is the pH of 10 L of a buffer solution containing 0.01 M NH_4Cl and 0.1 M NH_4OH having pK_b of 5 ?

A) 8

B) 7

C) 10

D) 5

31. Q.Id: 155281

Find the value of the equilibrium constant (K) of a reaction at 300 K when standard Gibbs free energy change is - 25 kJmol^{-1} ? (Consider R = 8.33 J $mol^{-1}K^{-1}$)

A) e^8

B) e^9

C) e^{10}

D) e^{11}

32. Q.Id: 155280

The emperical formula of a compound is C_2H_5O and its vapor density is 45. What is the molecular formula of the compound?

A) C_2H_5O

B) $C_6H_{13}O_3$

C) $C_4H_{10}O_2$

D) $C_6H_{15}O_3$

33. Q.Id: 155279

For a given unbalanced reaction, $MnO_2 + HCl \rightarrow MnCl_2 + H_2O$, which is the limiting reagent if the initial amount for each of the reactant is 100 grams?

[Molar masses: $MnO_2 = 86.9; HCl = 36.5; MnCl_2 = 125.8; Cl_2 = 70.9; H_2O = 18$]

A) MnO_2

B) HCl

C) $MnCl_2$

D) Cl_2

34. Q.Id: 155278

A vessel of volume 24.6 L contains 1..5 moles of H_2 and 2.5 moles of N, at 300 K.Calculate the partial pressure of N_2 in the vessel.

A) 1.5 atm

B) 2.0 atm

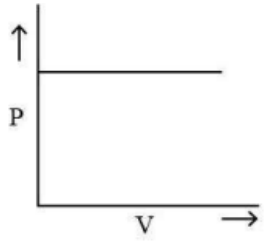
C) 2.5 atm

D) 3.0 atm

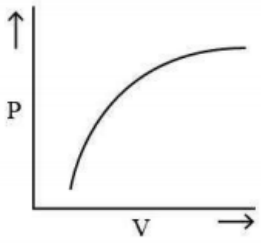
35. Q.Id: 155277

Which among the following graphs, correctly represents the Boyle's Law?

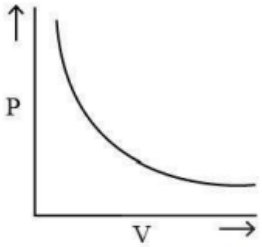
A)



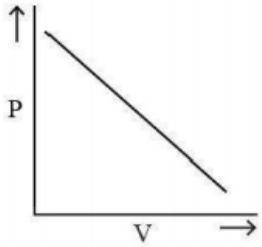
B)



C)



D)



36. Q.Id: 155276

Find out the correct hybridization of the central atom in BCl_3, PCl_5, NH_3 and SF_6

A) $(BCl_3:sp^3);(PCl_5:sp^3d^2);(NH_3:sp^2)$ and $(SF_6:sp^3d)$

B) $(BCl_3:sp^2);(PCl_5:sp^3d);(NH_3:sp^3)$ and $(SF_6:sp^3d^2)$

C) $(BCl_3:sp^2);(PCl_5:sp^3d^2);(NH_3:sp^3)$ and $(SF_6:sp^3d)$

D) $(BCl_3:sp^3);(PCl_5:sp^3d^2);(NH_3:sp^2)$ and $(SF_6:sp^3d^2)$

37. Q.Id: 155275

The correct order of H — N — H bond angles of ammonia, ammoniumion and amide are

A) $NH_2^- > NH_3 > NH_4^+$

B) $NH_4^+ > NH_3 > NH_2^-$

C) $NH_3 > NH_2^- > NH_4^+$

D) $NH_3 > NH_4^+ > NH_2^-$

38. Q.Id: 155274

Among the following, the pair of elements having same electronegativity values are

(i) H and P

(ii) Be md Al

(iii) N and Cl

(iv) C and P

A) (i),(ii) and (iii) only

B) (i),(iii) and (iv) only

C) (ii),(iii) and (iv) only

D) (i),(ii) (iii) and (iv)

39. Q.Id: 155273

Find the correct set with iso electronic species ?

A) N^{3-},F^{-},O_2,Ca^{2+}

B) $Ca^{2+},Cl^{-},Al^{3+},O_2^{-}$

C) $N^{3-},Mg^{2+},F^{-},O^{2-}$

D) $Mg^{2+},O_2^{-},Cl^{-},N_3^{-}$

40. Q.Id: 155272

The correct order of decreasing energy forthe electrons whose quantum members, n and I are given below, is

A) n = 5 and l = 2

B) n = 5 and l = 0

C) n = 4 and l = 3

D) n = 4 and l = 1

A) A>C>B>D

B) A>B>C>D

C) C>A>D>B

D) A>B>D>C

41. Q.Id: 155271

In the two elements $_{Z_1}A^{M_1}$ **and** $_{Z_2}B^{M_2}$ **,** $M_1 \neq M_2$ and $Z_1 \neq Z_2$ but $M_1 - Z_1 = M_2 - Z_2$**. These elements are (M is atomic weight,Z is atomic number)**

A) Isotonic

B) Isobaric

C) Isotopic

D) Isoelectronic

42. Q.Id: 155270

A message signal is super-imposed with a carrier signal. The resulting modulating signal $C_m(t)$ is given by $C_m(t) = A_1\sin(\omega_1 t) + A_2\sin(\omega_2 t) - A_3\sin(\omega_3 t)$ where $\omega_2 < \omega_1 < \omega_3$.The modulation index mid the angular frequency of the message signal respectively are

A) $\frac{A_2}{A_1}, \frac{\omega_3 - \omega_1}{2}$

B) $\frac{2A_2}{A_1}, \omega_3 - \omega_1$

C) $\frac{A_1}{2A_2}, \frac{\omega_3 - \omega_1}{2}$

D) $\frac{2A_2}{A_1}, \frac{\omega_3 - \omega_2}{2}$

43. Q.Id: 155269

In a Zener diode

A) Only p-region is heavily doped

B) Only n-region is heavily doped

C) Both p & n region are heavily doped

D) Both p & n region are lightly doped

44. Q.Id: 155268

A p-n junction diode can with stand upto 20 mA current under forward bias. The diode has a potential difference of 0.5V across it, which is assumed to be independent of current. What is the maximum voltage of the battery used to forward bias the diode when a resistance of $125\ \Omega$ is connected in series with it?

A) 3.0 V

B) 2.5 V

C) 3.2 V

D) 2.0 V

45. Q.Id: 155267

A radioactive element which cam decay by two processes, has huff-life t_1 for first process and half - life t_2 for second process. Let (t) be the effective average — life of this element. The correct statement is

A) $(t) < \frac{t_1 t_2}{t_1 + t_2}$

B) $(t) = \frac{t_1 t_2}{t_1 + t_2}$

C) $(t) > \frac{t_1 t_2}{t_1 + t_2}$

D) $(t) = \ln 2\left(\frac{t_1 + t_2}{t_1 t_2}\right)$

46. Q.Id: 155266

in the Bohr model an electron of mass m moves in a circular orbit around the proton. Considering the orbiting electron to be a circular current loop, the magnetic moment of the hydrogen atom, when the electron is in n^{th} excited state, is:

(Assume h = Planck's constant)

A) $\left(\frac{e}{2m}\frac{n^2h}{2\pi}\right)$

B) $\left(\frac{e}{m}\right)\frac{nh}{2\pi}$

C) $\left(\frac{e}{2m}\right)\frac{nh}{2\pi}$

D) $\left(\frac{e}{m}\right)\frac{n^2h}{2\pi}$

47. Q.Id: 155265

When the energy of incident radiation is increased by 20 %, the kinetic enemy of the photo electrons emitted from a metal surface increased from 0.5 eV to 0.8 eV. The work function of the metal is

A) 0.65 eV

B) 1.0 eV

C) 1.3 eV

D) 1.5 eV

48. Q.Id: 155264

At an instant, a plane electromagnetic wave has its magnetic field in the direction of the vector $\hat{i}-\hat{j}$ and its electric field is in the direction of $\hat{i}+\hat{j}$. The wave is travelling along which direction?

A) + x direction

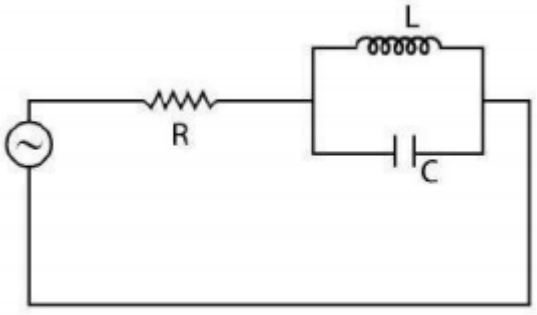
B) - x direction

C) + z direction

D) - z direction

49. Q.Id: 155263

The LCR circuit shown below is driven by an ideal AC voltage source.



At frequency $f=\frac{1}{2\pi\sqrt{LC}}$ **, the correct statement is**

A) The current through R is zero

B) The current through R is infinite

C) The current through R depends on the value of L and C

D) The current through R depends on the value of R and not L and C

50. Q.Id: 155262

A circular coil consists 70 closely wound turns and has a radius of 10 cm. An externally produced magnetic field of magnitude 2 x10^{-3} T is applied perpendicular to the coil. The net flux through the coil is found to vanish when the current in the coil is 2.2 A. The inductance of the coil is

A) 2 mH

B) 3 mH

C) 4 mH

D) 1.5 mH

51. Q.Id: 155261

Let m and r are the dipole moment and radius of earth respectively. Then the earth's magnetic field at the equator is

A) $\frac{\mu_0 m}{4\pi r^3}$

B) $\frac{\mu_0 m}{8\pi r^3}$

C) $\frac{\mu_0 m}{2\pi r^3}$

D) $\frac{\mu_0 m}{\pi r^3}$

52. Q.Id: 155260

A coil having 100 turns is wound tightly in the form of a spiral with inner and outer radii 1 cm and 2 cm respectively. When a current 1A passes through the coil, the magnetic field at the centre of the coil is

A) $2\pi\ell n(2)$ mT

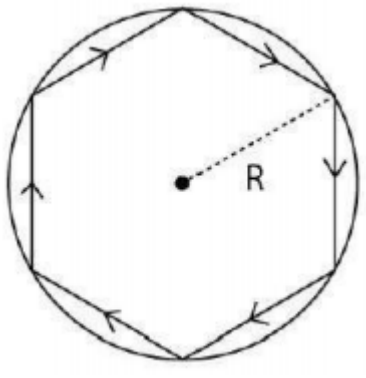
B) $\frac{\pi}{2}\ell n(2)$ mT

C) $\pi\ell n(2)$ mT

D) $\sqrt{2}\pi\ell n(2)$ mT

53. Q.Id: 155256

A conducting wire is in the shape of a regular hexagon which is inscribed inside an imaginary circle of radius R. If a current I flows the wire. the magnitude of magnetic field at the centre of the circle is



A) $\frac{\mu_2 J}{2\sqrt{3}\pi R}$

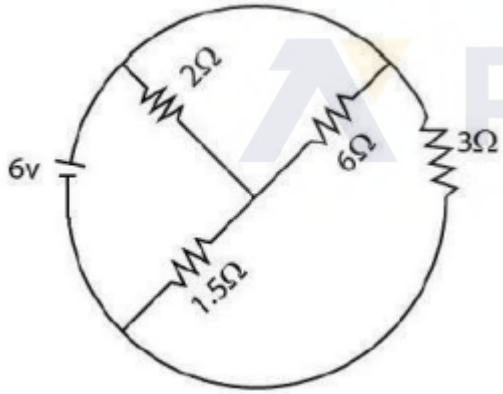
B) $\frac{\sqrt{3}\mu_2 J}{2\pi R}$

C) $\frac{3\mu_0 J}{2\pi R}$

D) $\frac{\sqrt{3}\mu_0 J}{\pi R}$

54. Q.Id: 155252

The tot.a1 current supplied to the following circuit bx the battery is



A) 4 A

B) 2 A

C) 1 A

D) 6 A

55. Q.Id: 155251

A conducting wife of cross-sectional area $1\ cm^2$ **has** 3×10^{23} **charge carriers per** m^3**. If wire curries a current of 24 mA, then drift velocity of carriers is**

A) $5\times10^{-2} m/s$

B) $0.5\ m/s$

C) $5\times10^{-3} m/s$

D) $5\times10^{-6} m/s$

56. Q.Id: 155249

A capacitor is fully charged with a battery and then disconnected. A dielectric is then inserted into the capacitor. How do charges on surface of the dielectric and outer surface of the plates of the capacitor would change respectively?

A) increases, decreases

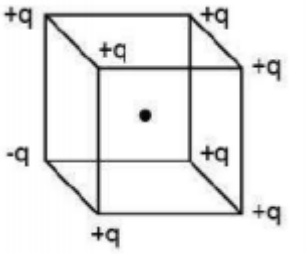
B) decreases, increases

C) increases, remain unchanged

D) remains unchanged. increases

57. Q.Id: 155246

A cube of side L has point charges+q located at its seven vertices and -q at remaining one vertex. The electric field at its center is found to be $|\vec{E}| = \alpha\left(\frac{q}{4\pi \in_0 L^2}\right)$**.The magnitude of constant** α **is**



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

B) $\frac{8}{3}$

C) 3

D) 1

58. Q.Id: 155244

The shape of wavefront of light diverging from point source

A) spherical

B) planar

C) cylindrical

D) circular

59. Q.Id: 155243

What minimum separation between two objects a human eye would be able to resolve, if the eye pupil diameter is 2min, and the two objects are 20ni away h' om the eye.

(Assume human eye to be equivalent to a convex lens and consider the average wave length of light as 600nm)

A) 7.32 mm

B) 8.72 mm

C) 6.2 mm

D) 4.71 mm

60. Q.Id: 155242

The magnifications produced by a convex lens for two position of an object are 4 and 3 respectively. If the distance of separation between the two positions of the object is 2 cm, then the focal length of the lens is

A) 20 cm

B) 16 cm

C) 28 cm

D) 24 cm

61. Q.Id: 155240

An organ pipe with both ends open has a length L = 25 cm An extra hole is created at position $\frac{L}{2}$. The lowest frequency of sound produced is (Assume speed of sound = 340 m/s)

A) 680 Hz

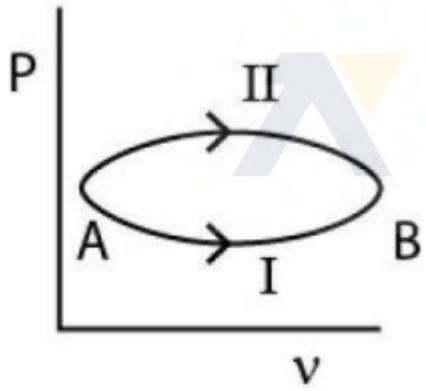
B) 340 Hz

C) 1360 Hz

D) 4352 Hz

62. Q.Id: 155237

A system goes from A to B via two processes I and II as shown in figure. If ΔU_1 and ΔU_2 are the changes in internal energies in the processes I and II respectively, then the relation between ΔU_1 and ΔU_2 is



A) $\Delta U_1 = \Delta U_2$

B) $\Delta U_2 < \Delta U_1$

C) $\Delta U_2 > \Delta U_1$

D) Undetermined

63. Q.Id: 155235

A carnot engine whose efficiency is 40%, receives heat at at 500 K. If the efficiency is to be 50%, the source temperature for the same exhaust temperature is

A) 900 K

B) 600 K

C) 700 K

D) 800 K

64. Q.Id: 155233

An ideal gas at temperature T, pressure P occupies a volume V. If its temperature is halved and pressure doubled, what is its new volume?

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

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

C) V

D) 2V

65. Q.Id: 155232

A heating element of mass 100 g and having specific heat of 1 I/(g°C) is exposed to surrounding air at 27°C. The element attains a steady state temperature of 127°C while absorbing 100 W of electric power. If the power is switched off. then approximate time taken by the element to cool down to 126 °C will be

(Neglect radiation)

A) 0.1 s

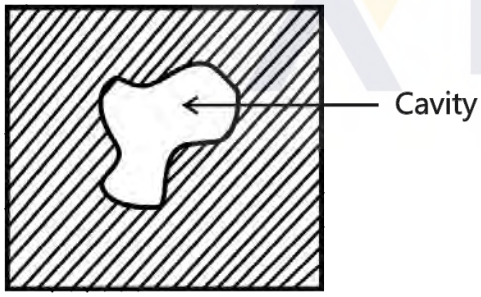
B) 1.0 s

C) 5.0 s

D) 10.0 s

66. Q.Id: 155231

A block of iron contains a hollow cavity as shown below. The block weighs 6000 N in air and 4000 N in water. If the density of iron and water are $6\ g/cm^3$ **and** $1\ g/cm^3$**, then the volume of the cavity is**(Assume $g = 10\ m/s^2$)



(Assiinie g = 10 nos)

A) $0.05\ m^3$

B) $0.5\ m^3$

C) $0.25\ m^3$

D) $0.1\ m^3$

67. Q.Id: 155228

A steel rod has a radius of 10 mm and a length of 1 m. A 80 kN force stretches it along its length. If the Young's modulus of the rod is $2\times10^{11} N/m^2$**, then the change in length is**

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

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

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

D) 1 mm

68. Q.Id: 155227

A planet is moving in an elliptical orbit round the sun. The work done on the planet by the gravitational force of the sun:

(a) is zero in no part of the motion

(b) is zero in some parts of the motion

(c) is zero in one completerevolution

(d) is zero in any small part of the orbit

A) Only (c) is true

B) Only (b),(c),(d) are true

C) Only (b) and (c) are true

D) Only (a) is true

69. Q.Id: 155209

Consider a single harmonic motion (SHM). Let K and U be kinetic energy and potentialenergy when the displacement in SHM is one -half $\left(\frac{1}{2}\right)$the amplitude.The correct statement is

A) $\frac{K}{U}=1$

B) $\frac{K}{U}=\frac{1}{2}$

C) $\frac{K}{U}=\frac{4}{3}$

D) $\frac{K}{U}=3$

70. Q.Id: 155205

A rod of length L revolves in a horizontal plane about the axis passing through its center and perpendicular to its length. The angular velocity of the rod is ω. If A is the area of cross-section of the rod andρ is its density, then the rotational kinetic energy of the rod is

A) $\frac{1}{3}AL^3\rho\omega$

B) $\frac{1}{2}AL^3\rho\omega^2$

C) $\frac{1}{24}AL^3\rho\omega^2$

D) $\frac{1}{18}AL^3\rho\omega^2$

71. Q.Id: 155204

A solid sphere of mass 2 kg rolls on a smooth horizontal surface at 10 m/s. It then rolls up a smooth inclined plane of inclination 30^o with the horizontal. The height attained by the sphere before it stop is [Take g as 10 $mm//sec^2$]

A) 70 cm

B) 701 cm

C) 7.0 m

D) 70 m

72. Q.Id: 155203

An elevator of mass 500 kg is ascending upwards with a constant acceleration a = 2 m/s^2. What is the work done by the tension in the elevator cable during its climb by 12 m?
(Take g = 10 m/s^2)

A) 36 KJ

B) 48 KJ

C) 72 KJ

D) 100 KJ

73. Q.Id: 155202

A force of 4 N acts on a 10 Kg body initially at rest. Let W_1 is work done by force during $0 \le t \le 1s$. Likewise W_2 is the work done by force during $1 \le t \le 2s$, where t is

time.The ratio $\frac{W_2}{W_1}$ is

A) 1

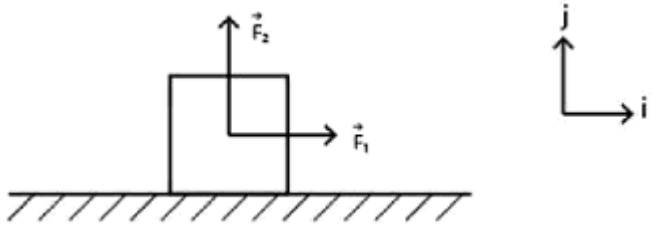
B) 2

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

D) 3

74. Q.Id: 155201

A block of mass m = 2 Kg is initially at rest on a horizontal surface. A horizontal force $\vec{F} = (6N)\,\hat{i}$ and a vertical force $\vec{F}_2 = (10N)\,\hat{j}$ are then applied to the block. The coefficients of static friction and kinetic friction for the block and the surface are 0.4 and 0.25 respectively. The magnitude of the frictions force acting on the block is
(Assume g = 10 m/s^2)



A) 2.5 N

B) 4.0 N

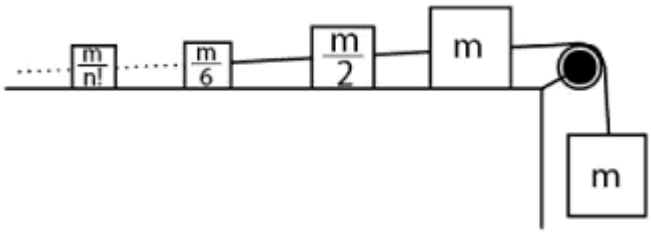
C) 3.3 N

D) 3.0 N

75. Q.Id: 155200

An infinite number of masses are placed on a frictionless table and they are connected via mass less strings. Their masses follow the sequence.

$m, \frac{m}{2}, \frac{m}{6}, \ldots\ldots \frac{m}{n!}$, **.....and they are further connected to a mass m that hangs over a massless pulley. The acceleration of the hanging mass is**



A) $\frac{g}{e-1}$

B) $\frac{g}{e+1}$

C) $\frac{g}{e}$

D) $\frac{g}{2e}$

76. Q.Id: 155199

A river 200 m wide is flowing at a rate of 3.0 m/s. A boat is sailing at a velocity of 15 m/s with respect to the water in a direction perpendicular' to the river. How far' from the point directly opposite to the starting point does the boat reach on the opposite bank?

A) 25 m

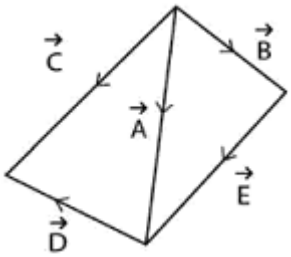
B) 60 m

C) 40 m

D) 50 m

77. Q.Id: 155198

Consider following vectors



The correct statement is

A) $\vec{E} = \vec{A} - \vec{B}$ and $\vec{A} = \vec{D} + \vec{C}$

B) $-\vec{E} = -\vec{A} + \vec{B}$ and $\vec{A} = -\vec{D} + \vec{C}$

C) $\vec{E} = -\vec{A} - \vec{B}$ and $\vec{E} = -\vec{B} + \vec{D} + \vec{C}$

D) $\vec{E} = -\vec{A} - \vec{B}$ and $\vec{E} = -\vec{B} + \vec{C} + \vec{D}$

78. Q.Id: 155197

A particle moving along x-axis has acceleration f. at time t. given by $f = f_0\left(1 - \frac{t}{T}\right)$, Where$f_0$ and T are constants. The particle at t = 0 has zero velocity. In the time interval between t = 0 and the instant when f = 0, the particle's velocity is

A) $\frac{1}{2}f_0T^2$

B) f_0T^2

C) $\frac{1}{2}f_0T$

D) f_0T

79. Q.Id: 155196

A person moves 30 in north and then 20m towards east and finally $30\sqrt{2}$ m in south west direction. The displacement of the person from the origin will be

A) 10 m along north

B) 10 m along south

C) 10 m along west

D) Zero

80. Q.Id: 155195

What is the dimension of $\frac{1}{\mu_0\varepsilon_0}$?

(μ_0 = magnetic permeability

ε_0 = permittivity of free space)

A) L^2T^{-2}

B) LT^{-1}

C) L^2T^2

D) LT^2

81. Q.Id: 155194

Let G,W,E and S be relative strength of gravitational, weak-nuclear electromagnetic and strong-nuclear forces respectively.The correct statement is

A) S > W > E > G

B) E > W > S > G

C) S > E > W > G

D) S > E > G > W

82. Q.Id: 155193

The general solution of the differential equation $(1+y^2)dx = (\text{Tan}^{-1}y - x)dy$ **is**

A) $x = (\text{Tan}^{-1}y) - 1 + Ce^{-\text{Tan}^{-1}y}$

B) $x = (\text{Tan}^{-1}y) - 1 + Ce^{\text{Tan}^{-1}y}$

C) $x = (\text{Tan}^{-1}y) - 1 + C$

D) $x = (\text{Tan}^{-1}y) + Ce^{-\text{Tan}^{-1}y}$

83. Q.Id: 155192

The general solution of the differential equation

$(x-2y+1)dy-(3x-6y+2)dx-0$ is

A) $\left|x+2y+\frac{3}{5}\right|^{\frac{2}{25}}.e^{115(x+2y)}=C$

B) $\left|x-2y+\frac{3}{5}\right|^{\frac{2}{25}}.e^{\frac{1}{5}(x+2y)}=C$

C) $\left|x-2y+\frac{3}{5}\right|^{\frac{2}{25}}.e^{\frac{1}{5}(6x+2y)}=C$

D) $\left|x-2y+\frac{1}{5}\right|^{\frac{2}{25}}.e^{\frac{1}{5}(x-2y)}=C$

84. Q.Id: 155191

The differential equation for which $lx^2+my^2=x+y$ **is the general solution is**

A) $\begin{vmatrix} x^2 & y^2 & x+y \\ 2x & 2y'y & y'+1 \\ 2 & 2yy'' & y'' \end{vmatrix}=0$

B) $\begin{vmatrix} x^2 & y^2 & x+y \\ 2x & 2yy' & 1+y' \\ 2 & 2(y^2+y'') & y'' \end{vmatrix}=0$

C) $\begin{vmatrix} x^2 & y^2 & x+y \\ 2x & 2yy' & y+1 \\ 2 & 2(y'^2+y'y'') & y'' \end{vmatrix}=0$

D) $\begin{vmatrix} x^2 & y^2 & x+y \\ 2x & 2y & 1+y' \\ 2 & 2yy'y'' & y'' \end{vmatrix}=0$

85. Q.Id: 155190

The area (in sq. units) of the portion lying above the X-axis and enclosed between the curves $y^2=2ax-x^2$ and $y^2=ax$ is

A) $a^2\left(\frac{-\pi}{2}+\frac{2}{3}\right)$

B) $a^2\left(\frac{2}{3}+\frac{\pi}{4}\right)$

C) $a^2\left(\frac{\pi}{4}-\frac{2}{3}\right)$

D) $a^2\left(\frac{\pi}{4}+\frac{2}{3}\right)$

86. Q.Id: 155189

$\int_3^5 (x-3)^3(5-x)^5\,dx\ =$

A) $\frac{64}{63}$

B) $\frac{25}{7}$

C) $\frac{3}{32}$

D) $\frac{16}{25}$

87. Q.Id: 155188

If $f(x)=\sin^6x+\cos^6x+2\sin^3x\cos^3x$, **then** $\int_0^{\pi/4}\frac{\sin^2 2x}{f(x)}dx=$

A) 2

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

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

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

88. Q.Id: 155187

The positive integer $n \leq 5$ **for which** $\int_0^1 e^x(x-1)^n dx = 16-6e$ is

A) 5

B) 4

C) 3

D) 2

89. Q.Id: 155186

$I_{m,n}=\int x^m(\log X)^n\,dx=$

A) $\frac{x^{m+1}}{m+1}(\log x)^n-\frac{n}{m+1}I_{m,n-1}$

B) $\frac{x^m}{m}(\log x)^n-\frac{n-1}{m+1}I_{m+1,n-1}$

C) $\frac{x^{m+1}}{m}\frac{(\log x)^{n+1}}{n+1}-\frac{n}{m+1}I_{m,n-1}$

D) $x^m\frac{(\log x)^{n+1}}{n+1}-\frac{n}{m+1}I_{m,n-1}$

90. Q.Id: 155185

$\int\frac{25x^2+8}{25x^2+9}dx=$

A) $\frac{x}{2}\sqrt{25x^2+9}+\frac{11}{10}\sinh^{-1}\left(\frac{5x}{3}\right)+C$

B) $\frac{x}{2}\sqrt{25x^2+9}-\frac{7}{10}\log\left(\frac{5x+\sqrt{25x^2+9}}{3}\right)+C$

C) $\frac{x}{2}\sqrt{25x^2+9}+\frac{7}{10}\sinh^{-1}\left(\frac{5x}{3}\right)+C$

D) $\frac{x}{2}\sqrt{25x^2+9}+\frac{11}{10}\log\left(\frac{5x-\sqrt{25x^2+9}}{3}\right)+C$

91. Q.Id: 155184

If $\int e^{\sin^2 x}(\sin x\cos x+\cos^3 x\sin x)dx=e^{\sin^2 x}(1+f(x))+c$.**then** $f'(x)=$

A) $\frac{1}{2}\sin^2 x$

B) $\frac{1}{2}\cos^2 x$

C) $-\frac{1}{2}\cos 2x$

D) $-\frac{1}{2}\sin 2x$

92. Q.Id: 155183

A function y = f(x) with f(-1) = - 249 has no maximum and has only one minimum at x = 5 with f(5) =75 . Which one of the following is true?

A) At some point in (-1, 5),f(x) is discontinuous

B) The minimum value cannot be 75 since f(-1) < f(5) = 75

C) f(x) is discontinuous at every point of $\mathbb{R}$

D) f(x) is discontinuous on $\mathbb{R}$

93. Q.Id: 155182

Statement (I): If $a_0+\frac{a_1}{2}+\frac{a_2}{3}+...+\frac{a_n}{n+1}=0$, where $a_0,a_1,.....a_n$ **are real numbers, then the polynomial** $a_0+a_1x+a_2x^2+....+a_nx^n$ **has a zero in the interval (0,1)**

Statement (II): If $f:[a,b]\to\mathbb{R}$ **is continuous on [a,b] and f is differentiable in (a,b), where a > 0 and if** $\frac{f(a)}{a}=\frac{f(b)}{b}$ **' then there exists c** $\in$ **(a,b) such that c f'(c) = f(c)**

A) Only (I) is true

B) Only (II) is true

C) Neither (I) nor (II) is true

D) Both (I) and (II) are true

94. Q.Id: 155181

$x_1,x_2\in\mathbb{N}$. **if a line having slope 2 is a tangent to the curve** $y=x^4-6x^3+13x^2-10x+5$ **at points** $P(x_1,y_1)$ and $Q(x_2,y_2)$, **then** $x_1x_2+y_1y_2=$

A) 7

B) -5

C) 13

D) -10

95. Q.Id: 155180

If the tangent and normal drawn to the curve $x=a(\theta+\sin\theta),y=a(1-\cos\theta)$ at $P\left(\theta=\frac{\pi}{2}\right)$ **cuts the X-axis at A and B respectively, then the area (in sq. units) of** ΔPAB **is**

A) $\frac{a^2}{\sqrt{2}}$

B) $\frac{\sqrt{2}}{a^2}$

C) a^2

D) $2a^2$

96. Q.Id: 155179

If $2^x+2^y=2^{x+y}$,then $\frac{dy}{dx}=$

A) $1-2^y$

B) $1-2^{-y}$

C) $1+2^y$

D) $1+2^{-y}$

97. Q.Id: 155178

If p(x) be a polynomial satisfying p(2x) = p'(x).p''(x),then $\sum_{x=1}^{5} p(x) =$

A) 200 **B)** 100

C) 50 **D)** 450

98. Q.Id: 155176

If $x\sqrt{1+y}+y\sqrt{1+x}=0$,then $\frac{dy}{dx} =$

A) $\frac{-1}{(1+x)^2}$ **B)** $\frac{1}{(1+x)^2}$

C) $\frac{2}{(1+x)^{3/2}}$ **D)** $\frac{-2}{(1+x)^{1/2}}$

99. Q.Id: 155174

Assertion (A) : $f(x)=|x-a|+|x-b|$, is continuous on $\mathbb{R}$

Reason (R) : $\frac{|x-\alpha|}{x-\alpha}$ is continuous at $x \in \mathbb{R}-\{\alpha\}$

A) (A) is true, (R) is true end (R) is the correct explanation for A **B)** (A) is true, (R) is true but (R) is not the correct explanation for A

C) (A) is true, but (R) is false **D)** (A) is false but (R) is true

100. Q.Id: 155171

$\lim_{x\to 0} \frac{x\tan 4x-2x\tan 2x}{(1-\cos 4x)^2} =$

A) $\frac{1}{8}$ **B)** $\frac{1}{4}$

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

101. Q.Id: 155169

The equation of the plane passing through the line of intersection of planes $\pi_1=2x+6y+4z-7=0, \pi_2=x-y-2z-2=0,$ **and perpendicular to the plane x + y + 2z - 5 = 0 is**

A) 3x + y - 2z = 0 **B)** 6x + 2y - 4z + 55 = 0

C) 6x + 2y - 4z - 15 = 0 **D)** 3x + y - 2z - 15 = 0

102. Q.Id: 155163

If the direction ratios a, I›, c of a line L satisfy the relations ab + bc + ca = 0 and 6ab + 9 bc + 8 = 0, then the direction cosines of the line L are

A) $\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}$

B) $\frac{2}{\sqrt{7}},\frac{1}{\sqrt{7}},\frac{-2}{\sqrt{7}}$

C) $\frac{-1}{\sqrt{6}},\frac{\sqrt{3}}{\sqrt{6}},\frac{\sqrt{2}}{\sqrt{6}}$

D) $\frac{-3}{7},\frac{2}{7},\frac{-6}{7}$

103. Q.Id: 155155

E (1, 0. 0), F (0. 2. 0), G (0, 0, 3) are respectively the mid points of the sides AB, BC,CA of Δ ABC.If a_1,b_1,c_1 and a_2,b_2,c_2 are respectively the direction ratios of AF and BG, then $\frac{a_1^2+b_1^2+c_1^2}{a_2^2+b_2^2+c_2^2}=$

A) $\frac{26}{41}$

B) $\frac{13}{26}$

C) $\frac{17}{43}$

D) $\frac{13}{43}$

104. Q.Id: 155146

A rectangular hyperbola passing through (3, 2) has its asymptotes parallel to the coordinate axes. If (1, 1) is the point of intersection of the two perpendicular tangents of that hyperbola, then its equation is

A) $xy=x+\frac{1}{y}$

B) $x\left(y+1+\frac{1}{x}\right)=1$

C) $x(1-y)=y-1$

D) $xy = x + y + 1$

105. Q.Id: 155141

The equation of the ellipse with directrix 3x + 4y - 5 = 0, focus (1,2) and eccentricity $\frac{1}{2}$, is

A) $x^2+84y^2-24xy-360y+170x+475=0$

B) $91x^2+84y^2-24xy-170x-360y+475=0$

C) $91x^2+84y^2-24xy-170x+360y+475=0$

D) $91x^2+84y^2-24xy-170x-360y-475=0$

106. Q.Id: 155136

If the sum of the distances from the foci to the centre O(0, 0) of an ellipse is $8\sqrt{6}$ units and the area of the smallest rectangle in which that ellipse is inscribed is 80 sq. units, then the equation of such an ellipse is

A) $\frac{x^2}{100}+\frac{y^2}{64}=1$

B) $\frac{x^2}{100}+\frac{y^2}{16}=1$

C) $\frac{x^2}{10}+\frac{y^2}{4}=1$

D) $\frac{x^2}{100}+\frac{y^2}{4}=1$

107. Q.Id: 155132

If the tangent drawn ct the point P(4, 8) to the parabola y^2 = l6x meets the parabolay^2 = 16x + 80 at A and B, then the midpoint of AB is

A) (9,6)

B) (4,8)

C) (4,1)

D) (2,3)

108. Q.Id: 155128

If a circle with its centre at the focus of the parabola y^2 = 2px is such that it touches the directrix of the parabola, then a point of intersection of the circle and the parabola is

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

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

C) $\left(\frac{p}{2},-p\right)$

D) $\left(\frac{-p}{2},-p\right)$

109. Q.Id: 155121

The centre of the circle passing through the points of intersection of the circles $(x+3)^2+(y+2)^2=25$ and $(x-2)^2+(y-3)^2=25$ **and cutting the circle** $(x+1)^2+(y-2)^2=16$ **orthogonally os**

A) $\left(\frac{-27}{2},\frac{-25}{2}\right)$

B) (0,0)

C) $\left(\frac{16}{3},\frac{-25}{4}\right)$

D) $\left(\frac{4}{7},\frac{3}{7}\right)$

110. Q.Id: 155115

If the circles $x^2+y^2-2x-2y+k=0$ and $x^2+y^2+4x+6y+4=0$ **touch each other externally, then the point of contact of the two circles is**

A) $\left(\frac{-1}{5},\frac{-3}{5}\right)$

B) $\left(\frac{-1}{3},\frac{-1}{3}\right)$

C) (-1,-3)

D) (-1,-1)

111. Q.Id: 155109

If a circle of radius r touches the positive coordinate axes and also the circle $x^2+y^2-12x-10y+52=0$ externally, then the distance between the centres of the two circles is

A) 7

B) 5

C) 6

D) 8

112. Q.Id: 155106

If the circle$x^2+y^2-4x+6y+13-a^2=0$ and $x^2+y^2-10x-2y+17=0$ intersect in two distinct points, then 'a' is

A) $-8 < a < -2$

B) $a > 8$

C) $2 < a < -6$

D) $a < -8$

113. Q.Id: 155101

If the poles of the line .x - y = 0 with respect to the circles $x^2+y^2-2g_ix+c_i^2=0(i=1,2,3)$ are (α_i,β_i) then $\sum_{i=1}^{3}\frac{\alpha_i+\beta_i}{g_i}=$

A) 3

B) 6

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

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

114. Q.Id: 155096

Let P be the point of intersection of the lines $L_1\equiv x-y-7=0$ and $L_2\equiv x+y-5=0$. $A(x_1,y_1)$ and $B(x_2,y_2)$ are points on the lines $L_1=0$ and $L_2=0$ respectively such that $PA=3\sqrt{2}, PB=\sqrt{2}, x_1y_1\geq 0, x_2y_2\geq 0$, then the angle made by the line segment AB at the origin is

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

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

C) $\text{Cos}^{-1}\left(\frac{3}{4}\right)$

D) $\text{Cos}^{-1}\left(\frac{9}{\sqrt{85}}\right)$

115. Q.Id: 155093

Suppose O(0,0) is the origin and the line L = x + y -λ = 0 meets the curve $x^2+y^2-2x-4y+2=0$ at A and B. If $\angle AOB=90^o$ then the distance between such lines L = 0 is

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

B) $\frac{3}{\sqrt{2}}$

C) $\sqrt{2}$

D) $\sqrt{2}+1$

116. Q.Id: 155084

If two equal sides of an isosceles triangle are given by the equations 7x - y + 3 = 0 and x + y - 3 = 0, then 4he equation of its third side passing through the point (2, -5) is

A) $x - 3y = 17$

B) $3x - y = 11$

C) $7x + 2y = 4$

D) $3x + y = 11$

117. Q.Id: 155080

If the equation of the straight line passing through the point of intersection of x+ 2y -19 = 0,x - 2y 3 = 0 and which is at a perpendicular distance of ñ units from the point (-2, 4) is 5x + by + c = 0, their a possible value of 5 + b + c is

A) -108

B) 10

C) 86

D) -14

118. Q.Id: 155069

If the straight line passing through the point P (3.4) makes an angle $\frac{\pi}{6}$ with the positive direction of X-axis and meets the line 12x + 5y +10 = 0 at Q, then the length of PQ is

A) $\frac{44}{12\sqrt{2}+9}$

B) $\frac{66}{12\sqrt{3}+5}$

C) $\frac{132}{12\sqrt{3}+5}$

D) $\frac{148}{6\sqrt{2}+3}$

119. Q.Id: 155065

Let C be a curve $ax^2+2hxy+by^2+2gx+2fy+c=0$ in a cartesian plane. By rotating the coordinate axes through an angle $\frac{\pi}{4}$ in the positive direction, if the transformed equation of C is $Y^2+XY-X=0$, then $(h^2-ab)-2\,gf=$

A) 0

B) 2

C) 1

D) -1

120. Q.Id: 155057

If A = (1. 2). B = (2. 1) and P is any point satisfying the condition PA + PB = 3. then the equation of the locus of P is

A) $16x^2+7y^2-64x-48=0$

B) $x^2+10xy+25y^2-34x-170y=0$

C) $32x^2+8xy+32y^2-108x-108y+99=0$

D) $4x^2+12xy+9y^2-20x-30y=0$

121. Q.Id: 155051

Let $X \sim B(n,p)$ with mean μ and variance σ^2. If $\mu = 2\sigma^2$ and $\mu + \sigma^2 = 3$, then $P(X \leq 3) =$

A) $\frac{15}{16}$

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

C) $\frac{14}{17}$

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

122. Q.Id: 155045

A target is to be destroyed in a bombing exercise and there is a 75% chance that a bomb will hit the target. Assuming that two direct hits are required to destroy the target completely, the minimum number of bombs to be dropped in order that the probability of destroying the target is not less than 99%, is

A) 4

B) 5

C) 6

D) 7

123. Q.Id: 155043

A number is selected at random from the set {1. 2,.....,100} . Given that the number selected is divisible 2, the probability that it is also divisible by 3 or 5, is

A) $\frac{26}{50}$

B) $\frac{23}{50}$

C) $\frac{7}{50}$

D) $\frac{13}{50}$

124. Q.Id: 155038

Cards are drawn one after the other without replacement from a well-shuffled pack of cards until an ace card appears. If the probability that exactly 5 cards are drawn before the first ace card appears is $\frac{4}{49}\left(\frac{p_1 \cdot p_2 \cdot p_3}{p_4 \cdot p_5 \cdot p_6}\right)$, **(** p_i **is prime, i = 1, 2, 3, 4, 5, 6) then** $\left(\max\{p_i\} - \min\{p_i\}\right) =$

A) 12

B) 18

C) 20

D) 22

125. Q.Id: 155031

If the roots of each of the equations $2x^2+x-1=0, 3x^2-10x+3=0$ and $6x^2+11x-2=0$ **corresponds to probabilities of three events of a random experiment, then those events are**

A) Equally likely

B) Exhaustive

C) Mutually exclusive

D) Mutually independent

126. Q.Id: 155028

The mean deviation about the mean of the following data is nearly

Size(x)	1	3	5	7	9	11	13	15
Frequency(f)	3	3	4	14	7	4	3	4

A) 3.45

B) 3.25

C) 2.75

D) 2.95

127. Q.Id: 155027

The variance of the following frequency distribution is

Classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	11	2S	18	4	5	3

A) 165.3

B) 161.1

C) 282.1

D) 152.5

128. Q.Id: 155026

If $\bar{b},\bar{c}$ **are non collinear vectors,** $|\bar{c}|\neq 0$, $\bar{a}\times(\bar{b}\times\bar{c})+(\bar{a}.\bar{b})\bar{b}=(4-2\beta-\sin\alpha)\bar{b}+(\beta^2-1)\bar{c}$ **and** $(\bar{c}.\bar{c})\bar{a}=\bar{c}$, **then the scalars** α and β are

A) $\alpha=\frac{\pi}{2}+\frac{n\pi}{3}, n\in\mathbb{Z}; \beta=1$

B) $\alpha=2n\pi+\frac{\pi}{2}, n\in\mathbb{Z}$

C) $\alpha=\frac{\pi}{2}+(2n+1)\frac{\pi}{2}, n\in\mathbb{Z}; \beta=2$

D) $\alpha=(2n+1)\frac{\pi}{2}, n\in\mathbb{Z}; \beta=\frac{3}{2}$

129. Q.Id: 155014

Let $\bar{p},\bar{q},\bar{r}$ be three non-coplanar vectors and $[\bar{p},\bar{q},\bar{r}]\bar{a}=\bar{q}\times\bar{r},[\bar{p},\bar{q},\bar{r}]\bar{b}=\bar{r}\times\bar{p},[\bar{p},\bar{q},\bar{r}]\bar{c}=\bar{p}\times\bar{q}$. If $\bar{a},\bar{b},\bar{c}$ denote the coterminous edges of a parallelopiped , then its height with the base having $\bar{a}$ and $\bar{b}$ is

A) $\left|\bar{p}\right|$

B) $\frac{1}{\left|\bar{a}\right|}$

C) $\frac{1}{\left|\bar{b}\right|}$

D) $\frac{1}{\left|\bar{q}\right|}$

130. Q.Id: 155003

Let $\bar{a}=\bar{i}+2\bar{j}-2\bar{k}$ and $\bar{b}=2\bar{i}-\bar{j}-2\bar{k}$. If the oithogonal projection vector of $\bar{a}$ on $\bar{b}$ be .$\bar{x}$ and the orthogonal projection vector of $\bar{b}$ on $\bar{a}$ be $\bar{y}$, then $\left|\bar{x}-\bar{y}\right|=$

A) $\frac{4}{9}\sqrt{26}$

B) $\frac{8}{9}\sqrt{10}$

C) $\frac{4}{9}\sqrt{10}$

D) $\frac{8}{9}\sqrt{26}$

131. Q.Id: 154999

$\bar{l}$, $\bar{m}$, $\bar{n}$ are three unit vectors in a right handed system end L is a line through the points A, B, C whose position vectors are $\bar{p}l+7\bar{m}-6\bar{n}$, $\bar{2}l+5\bar{m}-4\bar{n}$ and $\bar{l}+4\bar{m}-3\bar{n}$ respectively. If the equation of the plane containing L end the point $(-p,p,p+1)$ is $ax+by+cz=1$, then $p(a+b+c)=$

(—p. p, p + l) is ux + by c- = 1, then p (n b + c —

A) 0

B) $\frac{-40}{19}$

C) $\frac{40}{19}$

D) -6

132. Q.Id: 154991

If the point of intersection of the lines

$\bar{r}=\bar{i}-6\bar{j}+(p\sec\alpha)\bar{k}+t\left(\bar{i}+2\bar{j}+\bar{k}\right)$ and $\bar{r}=4\bar{j}+\bar{k}+\lambda$

$\left(2\bar{i}+(p\text{ and }\alpha)\bar{j}+2\bar{k}\right)$ is $8\bar{i}+8\bar{j}+9\bar{k}$, $\left(\text{where } 0<\alpha<\frac{\pi}{2}\right)$,

then $p=$

A) $\sqrt{5}$

B) $\sqrt{3}$

C) $\sqrt{2}$

D) 0

133. Q.Id: 154989

Match the following

List1	List2
A. $\bar{a}=2\bar{i}+3\bar{j}+4\bar{k}$, $\bar{b}=3\bar{i}+4\bar{j}+2\bar{k}$, $\bar{c}=4\bar{i}+2\bar{j}+3\bar{k}$	I. A,B,C are collinear
B. $\bar{a}=\bar{i}+2\bar{j}+3\bar{k}$, $\bar{b}=3\bar{i}+4\bar{j}+7\bar{k}$, $\bar{c}=-3\bar{i}-2\bar{j}-5\bar{k}$	II. ΔABC is an isosceles triangle
C. $\bar{a}=2\bar{i}-\bar{j}+\bar{k}$, $\bar{b}=\bar{i}-3\bar{j}-5\bar{k}$, $\bar{c}=-3\bar{i}-4\bar{j}-4\bar{k}$	III. ΔABC is a right-angled triangle
D. $\bar{a}=\bar{i}+\bar{j}+\bar{k}$, $\bar{b}=\bar{i}+2\bar{j}+3\bar{k}$, $\bar{c}=2\bar{i}-\bar{j}+\bar{k}$	IV. ΔABC is a right-angled isosceles triangle.
E. .	V. ΔABC is an equilateral triangle

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

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

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

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

134. Q.Id: 154966

In a ΔABC, with usual notation, if $r = r_1 - r_2 - r_3$, then 2R =

A) a

B) b + c

C) c

D) c + a

135. Q.Id: 154964

The perimeter of a ΔABC is 6 times the arithmetic mean of the sine of its angles. If its side BC is of unit length, then $\angle A$ =

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

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

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

D) π

136. Q.Id: 154959

If $\text{Sech}^{-1}\left(\frac{1}{2}\right)-\text{Cosech}^{-1}\left(\frac{3}{4}\right)=\log_e k$, **then**

A) $3k^2-12k-1=0$

B) $3k^2-12k+1=0$

C) $9k^2-12k+1=0$

D) $9k^2-12k-1=0$

137. Q.Id: 154956

The number of real roots of the equation $\sin\left[2\text{Cos}^{-1}\{\cot(2\,\text{Tan}^{-1}x)\}\right]=0$ **that are greater than or equal to one are**

A) 1

B) 2

C) 3

D) 4

138. Q.Id: 154952

If $|\sin x-\cos^2 x|\geq|3-3\sin x+\sin^2 x|+4|\sin x-1|$ **then x =**

A) $(4n+1)\frac{\pi}{2},n\in\mathbb{Z}$

B) $2n\pi+\frac{\pi}{3},n\in\mathbb{Z}$

C) $n\pi+\frac{\pi}{2},n\in\mathbb{Z}$

D) $2n\pi+\frac{\pi}{6},n\in\mathbb{Z}$

139. Q.Id: 154948

If $A+B+C=60^0$ **then** $\cos(30^0-A)+\cos(30^0-B)+\cos(30^0-C)+\sin(A+B+C)=$

A) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

B) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

C) $4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

D) $4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

140. Q.Id: 154942

If $\alpha=\frac{\sin^3 x}{\cos^2 x},\ \beta=\frac{\cos^3 x}{\sin^2 x}$ **and** $\sin x+\cos x=k$ **then** $\alpha\sin x+\beta\cos x+3=$

A) $\frac{2}{(k^2-1)^2}$

B) $\frac{4}{(k^2-1)^2}$

C) $\frac{k^2-1}{2}$

D) $\frac{(k^2-1)^2}{4}$

141. Q.Id: 154938

The period of $\frac{\sin x}{\cos 3x}+\frac{\sin 3x}{\cos 9x}+\frac{\sin 9x}{\cos 27x}+\frac{\sin 27x}{\cos 81x}$ **is**

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

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

C) 2π

D) π

142. Q.Id: 154935

If $\frac{1}{x^4+x^2+1}=\frac{Ax+B}{x^2+x+1}+\frac{Cx+D}{x^2-x+1}$ **, then** $\text{Cos}^{-1}(A+B+C+D)=$

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

B) 0

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

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

143. Q.Id: 154932

For $z\in C$, if $(1+z)^n=1+{}_nC_1+{}_nC_2\,z^2+....{}_nC_n\,z^n$ **and**

$\sum_{r=0}^{100}{}_{100}C_r(\sin r\,x)=\left(2\cos\frac{x}{2}\right)^{100}\sin k\,x$, then $k=$

A) 25

B) 100

C) 50

D) 75

144. Q.Id: 154930

Suppose l,m,n respectively represent the coefficient of x^{10}**, the constant term and the coefficient of** x^{-10} **in the expansion of** $\left(ax^2+\frac{b}{x^3}\right)^{15}$ **.If** $\frac{l}{m}+\frac{m}{n}=\frac{26}{11}$**, then** $a^2:b^2=$

A) 16 : 9

B) 9 : 4

C) 4 : 1

D) 1 : 25

145. Q.Id: 154926

If 3 sisters and 8 other girls are together playing a game, then the number of ways in which all the girls are seated around a circle such that the three sisters are not seated together, is

A) $11!\times 8$

B) $8!\times 504$

C) $7!\times 210$

D) $8!\times 84$

146. Q.Id: 154922

The number of integers x, y, z, w satisfying x + y + z + w = 25 and x , y , z ≥ -1, w ≥ 1, is

A) ${}_{28}C_3$

B) ${}_{30}C_3$

C) ${}_{29}C_3$

D) ${}_{31}C_3$

147. Q.Id: 154919

If α,β,γ are the roots of the equation $x^3+3x^2-x-3=0$ then $(1+\alpha^2)(1+\beta^2)(1+\gamma^2)=$

A) 16

B) 24

C) 36

D) 40

148. Q.Id: 154915

If the roots of $x^3+ax^3+bc+c=0$ are in arithmetic progression with common difference 1, then

A) 9c = a(b - 2)

B) 9c = a(2 - b)

C) $9c-a^2(b-2)=0$

D) $9c-a^2(2-b)=0$

149. Q.Id: 154910

If the quadratic equations $3x^2-7x+2=0$ and $kx^2+7x-3=0$ have a common root then the positive value of k is

A) 6

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

C) 4

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

150. Q.Id: 154908

p and q are two roots of the equation $x^2+7x+3=0$. If $\frac{3p}{1-2p},\frac{3p}{1-2p}$ are the roots of $lx^2+mx+n=0$ and the greatest common divisor of l,m,n is 1,then l - m + n =

A) 11

B) -3

C) -1

D) 12

151. Q.Id: 154906

Let $A_r = \left(x+\frac{1}{x}\right)^3.\left(x^2+\frac{1}{x^2}\right)^3.\left(x^3+\frac{1}{x^3}\right)^3....\left(x^r+\frac{1}{x^r}\right)^3$. **If** $x^2+x+1=0$, **then** $\frac{1}{A_3}+\frac{1}{A_6}+\frac{1}{A_9}+\frac{1}{A_{12}}+....\infty =$,

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

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

C) 1

D) $\frac{1}{7}$

152. Q.Id: 154902

For $n \in N$, If $A_n = \cos\left(\frac{\pi}{2^n}\right)+i\sin\left(\frac{\pi}{2^n}\right)$, then $\left(A_1 A_2 A_3 A_4\right)^4 =$

A) $\frac{-1-i}{\sqrt{2}}$

B) 1

C) 0

D) $\frac{1-i}{\sqrt{2}}$

153. Q.Id: 154898

$A(z_1 = 2+2i)$, $B(z_2)$, $C(z_3)$ **are three points on the Argand plane satisfying** $|z_k - 2i| = 2, (k = 1,2,3)$. If ΔABC **encloses the maximum area, then the sum of the imaginary parts of** z_2 and z_3 is

A) 1

B) 0

C) 4

D) -4

154. Q.Id: 154895

For some a,b,c $\in$ **R, if** $\sin 5\theta = a\cos^4\theta \sin\theta + b\cos^2\theta \sin^3\theta + c\sin^5\theta$, then abc =

A) -10

B) 10

C) 0

D) -50

155. Q.Id: 154890

If $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 3 & -1 \\ 1 & -1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix}=\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, then $\begin{bmatrix} x \\ y \\ z \end{bmatrix}=$

A) $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}+K\begin{bmatrix} 3 \\ 1 \\ -2 \end{bmatrix}, K \in R$

B) $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}+K\begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}, K \in R$

C) $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}+K\begin{bmatrix} -2 \\ 1 \\ 3 \end{bmatrix}, K \in R$

D) $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}+K\begin{bmatrix} -2 \\ 1 \\ 3 \end{bmatrix}, K \in R$

156. Q.Id: 154885

Let $[A]_{3\times 3}$ **be a non-singular matrix such that** $A^{-1}=\frac{1}{3}(A^2-5A+7I)$ **then** $17A^8-85A^7+119A^6-51A^5-19A^4+95A^3-133A^2+58A+I=$

A) 0

B) A

C) A + I

D) A^2+A+I

157. Q.Id: 154881

A value of θ **in** $\left(0,\frac{\pi}{2}\right)$ **and satisfying** $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix}=0$ **is**

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

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

C) $\frac{5\pi}{24}$

D) $\frac{7\pi}{24}$

158. Q.Id: 154877

n^5-5n^3+4n **is divisible by 120 is true for**

A) All positive integers n

B) All positive integers for $n \geq 3$ only

C) All positive integers for $n \geq 1$ only

D) All positive integers for $n \geq 5$ only

159. Q.Id: 154872

Let [x] denote the greatest integer not more than x. If A and B are the domains of the functions $f(x)=\frac{x-[x]}{\sqrt{|x|-x}}$ **and** $g(x)=\frac{x-[x]}{\sqrt{|x|+x}}$ **respectively,then**

A) $A \cup B = R$

B) $A \cap B = \phi$

C) $A-B=(-\infty,0)$

D) $B-A=(0,\infty)$

160. Q.Id: 154869

If $f:[-3,2]\to[0,\sqrt[3]{x}]$ **is an into function defined by**

$$f(n)=\begin{cases}2+\sqrt[3]{n}, & -3\le n\le -1\\ n^{2/3}, & -1\le n\le 2\end{cases}$$ then $x=$

A) 1

B) 2

C) 4

D) 6