VITEEE 2010 Answer key and cutoff will be available at http://engg.entrancecorner.com on 17th April at 10 PM.

VITEEE 2010 Exam Pattern:

The question paper will contain 4 [Four] parts as indicated below. All Questions will be of OBJECTIVE TYPE.

_ PART-I – Physics 40 questions
_ PART-II – Chemistry 40 questions
_ PART-III – Mathematics 40 questions
_ PART-IV – Biology 40 questions (applicable only for those who want to get into Bioinformatics, Bio-Medical Engineering and Biotechnology programmes only.

No negative Marking

--This Paper contains 200 Questions of Physics, Chemistry and Math however in original paper you will get only 120 questions of PCM.

PHYSICS (Question 1 to 60)

Q1 One centimeter on the main scale of venire calipers is divided into ten equal parts. If 10 divisions of venire scale coincide with 8 small divisions of the main scale, the least count of the calipers is

1. 0.01 cm
2. 0.02 cm
3. 0.05 cm
4. 0.005 cm

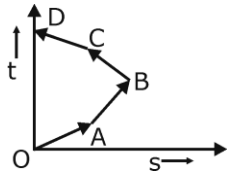
Q2. The relative density of the material of a body is the ratio of its weight in air and the loss of its weight in water. By using a spring balance, the weight of the body in air measured to be(5.00 0.05 N while in water it reads $(4 \pm 0.05)N$. Then the maximum possible percentage error in relative density is

1. 11 %
2. 10 %
3. 9%
4. 7%

Q3. The pairs of physical quantities that have the same dimensions are

1. Reynolds number and coefficient of friction
2. Latent heat and gravitational potential
3. Curie and frequency of light wave
4. Planck's constant and torque

Q4. Which of the following options is correct for the object having a straight line motion represented by the following graph



1. The object moves with constantly increasing velocity from O to A and then it moves with constant velocity

2. Velocity of the object increases uniformly

3. Average velocity is zero

4. The graph shown is impossible

Q5. Equation of displacement for any particle is $s = 3t^3 + 7t^2 + 14t + 8m$. Its acceleration at time t = 1 sec is

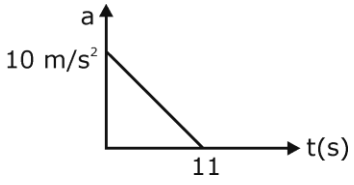
1. 10 m/s^2

2. 16 m/s^2

3. 25 m/s^2

4. 32 m/s^2

Q6. A particle starts from rest. Its acceleration (a) versus time (t) is as shown in the figure. The maximum speed of the particle will be



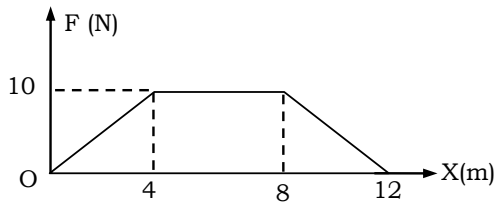
1. 100 m/s

2. 55 m/s

3. 550 m/s

4. 660 m/s

Q7. A particle of mass 0.1 kg is subjected to a force which varies with distance as shown in fig. If it starts its journey from rest at $x = 0$, its velocity at $x = 12$ m is

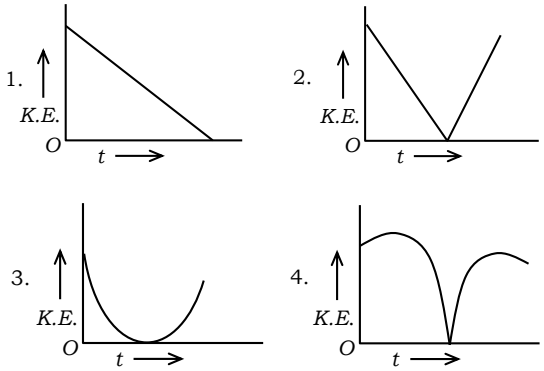


1. 0 *m/s*
2. $20\sqrt{2}\,m/s$
3. $20\sqrt{3}\,m/s$
4. 40 *m/s*

Q8. A bullet of mass 0.01 Kg and travelling at a speed of 500 *m/s* strikes a block of mass 2 Kg which is suspended by a string of length 5 *m*. The centre of gravity of the block is found to rise a vertical distance of 0.1 *m*. The speed with which the bullet emerges from the block is:

1. 110 *m/s*
2. 220 *m/s*
3. 55 *m/s*
4. 440 *m/s*

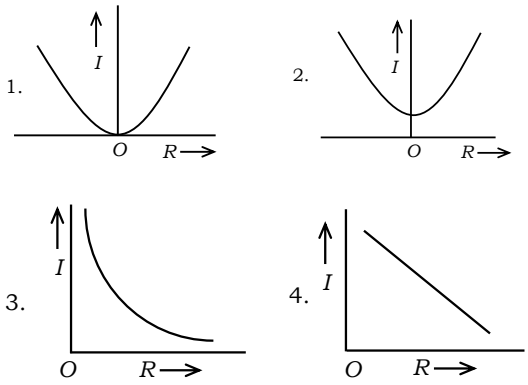
Q9. A ball is projected vertically upwards with an initial velocity. Which of the following graphs best represents the *K.E.* of the ball as a function of time from the instant of projection till it reaches the point of projection?



Q10. Two particles A and B initially at rest move towards each other under a mutual force of attraction. At the instant when velocity of A is v and that of B is 2v, the velocity of centre of mass of the system is

1. v
2. 2 v
3. 3 v
4. zero

Q11.The curve for the moment of inertia of a sphere of constant mass *M* versus its radius *R* will be:



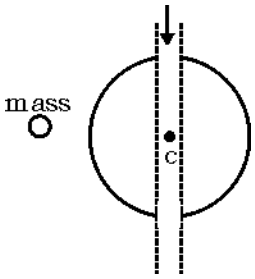
Q12. There are some passengers inside a stationary railway compartment. The centre of mass of the compartment itself (without the passengers) is C_1, while the centre of mass of the 'compartment plus passengers' system is C_2. If the passengers move about inside the compartment.

1. Both C_1 and C_2 will move with respect to the ground
2. Neither C_1 nor C_2 will move with respect to the ground
3. C_1 will move but C_2 will be stationary with respect to the ground
4. C_2 will move but C_1 will be stationary with respect to the ground.

Q13. A satellite revolves around the earth in an elliptical orbit. Its speed:

1. Is the same at all points in the orbit
2. Is greatest when it is closest to the earth
3. Is greatest when it is farthest from the earth
4. Goes on increasing or decreasing continuously depending upon the mass of the satellite

Q14. A ball of mass m is dropped from a height h equal to radius of the Earth above the tunnel dug through the earth as shown in figure. Choose the correct options :



1. Particle will oscillate through the earth to a height h on both sides
2. Particle will execute S.H.M.
3. Particle passes the centre of earth with speed $V = \sqrt{\frac{2GM}{R}}$
4. All of these

Q15. A spherical planet has a mass M_0 and diameter D_0. A particle of mass m falling freely near the surface of this planet will experience acceleration due to gravity which is proportional to:

1. M_0 / D_0^2
2. $4mM_0 / D_0^2$
3. $4M_0 / D_0^2$
4. mM_0 / D_0^2

Q16. One end of a long metallic wire of length L is tied to the ceiling. The other end is tied to a massless spring of spring constant K. A mass m hangs freely from the free end of the spring. The area of cross-section and Young's modulus of the wire are A and Y respectively. If the mass is slightly pulled down and released, it will oscillate with a time period given by

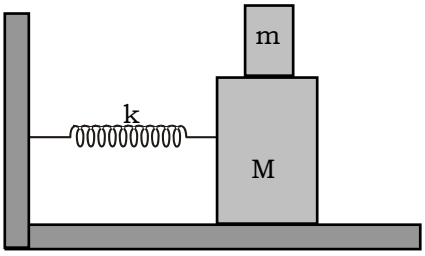
1. $2\pi \sqrt{\frac{m}{k}}$
2. $2\pi \left[\frac{(yA+KL)m}{YAK}\right]^{1/2}$
3. $2\pi \left(\frac{mYA}{KL}\right)$
4. $2\pi \left(\frac{mL}{YA}\right)$

Q17. A rigid cubical block A of mass M and side L is fixed rigidly on to another cubical block of the same dimensions and of modulus of rigidity η such that the lower face of A completely covers the upper face of B. The lower face of B is rigidly held on a horizontal surface. A small F is applied perpendicular to one of the side faces of A. After the force is withdrawn, block A executes small oscillations, the time period of which is

1. $2\pi \sqrt{M\eta L}$
2. $2\pi \sqrt{\frac{M\eta}{L}}$
3. $2\pi \sqrt{\frac{ML}{\eta}}$

4. $2\pi\sqrt{\frac{M}{\eta L}}$

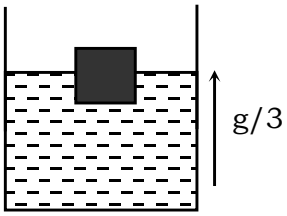
Q18.A mass M is attached to a horizontal spring of force constant k fixed one side to a rigid support as shown in Fig. The mass oscillates on a frictionless surface with time period T and amplitude A. When the mass is in equilibrium position, another mass m is



gently placed on it. What will be the new amplitude of oscillations?

1. $A\sqrt{\left(\frac{M}{M-m}\right)}$
2. $A\sqrt{\frac{M - m}{M}}$
3. $A\sqrt{\frac{M}{M + m}}$
4. $A\sqrt{\frac{M + m}{M}}$

Q19. A cubical block is floating in a liquid with half of its volume immersed in the liquid. When the whole system accelerates upwards with a net acceleration of g/3. The fraction of volume immersed in the liquid will be



1. 1/2
2. 3/8
3. 2/3
4. 3/4

Q20. A concrete sphere of radius R has a cavity of radius r which is packed with sawdust. The relative densities of concrete and sawdust are 2.4 and 0.3 respectively. For this sphere to float with its entire volume submerged under water, the ratio of the mass of concrete to the mass of sawdust will be

1. 8
2. 4
3. 3
4. Zero

Q21 The rate of flow of a liquid through a capillary tube under a constant pressure head is Q. If the diameter of the tube is reduced to half and its length is doubled, then the new rate of flow of liquid will be

1. $\frac{Q}{4}$
2. $\frac{Q}{8}$
3. 16 Q
4. $\frac{Q}{32}$

Q22. A Coil of inductance 300 mH and resistance 2Ω is connected to a source of voltage 2V. The current reaches half of its steady of its steady state value in

1. 0.15 s
2. 0.3 s
3. 0.5 s
4. 0.1 s

Q23. In a transformer, number of turns in the primary are 140 and that in the secondary are 280. If current In primary is 4A then that in the secondary is

1. 4A
2. 2A
3. 6A
4. 10A

Q24. In an LCR series ac circuit, the voltage across each of the components, L, C and R is 50V, the voltage across the LC combination will be

1. 50V
2. $50\sqrt{2}$ V
3. 100V
4. 0 V(zero)

Q25. According to kinetic theory of gases the temperature of a perfect gas is

1. Independent of the kinetic energy of the molecules.
2. Inversely proportional to kinetic energy of the molecules.
3. Directly proportional to both kinetic energy and potential energy of the molecules.
4. Directly proportional to kinetic energy of the molecules.

Q26. At absolute zero temperature

1. The molecule of gas will have the same velocity as at 0°C
2. The molecule of gas will have the same velocity as at 100°C
3. The molecule of the gas will have zero velocity.
4. Two molecule of the gas have very high velocities

Q27.A vessel contains 1 mole of O_2 gas (molar mass 32) at a temperature T. The pressure of the gas is P. An identical vessel containing one mole of He gas (molar mass 4) at a temperature 2T has a pressure of

1. P/8
2. P
3. 2P
4. 8P

Q28. An object is placed at a distance of 12 cm from a convex lens on its principal axis and a virtual image of certain size of formed. On moving the object 8 cm away from the lens, a real image of the same size as that of virtual image is formed. The focal length of the lens in cm is

1. 15
2. 16
3. 17
4. 18

Q29. An object is placed at a distance (f/2) from a convex lens. The image will be

1. at one of the foci, virtual and double in size
2. at f, real and inverted
3. at 2f, virtual and erect
4. at (3/2) f, real inverted

Q30. In Young's interference experiment, the central bright fringe can be identified due to the fact that it

1. Has grater intensity than other fringes which are bright
2. Is wider than the other bright fringes
3. Is narrower than the other bright fringes
4. Can be obtained by using white light instead of monochromatic light

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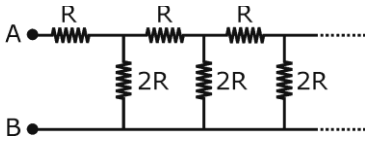
Q31. A certain piece of silver of given mass is to be made like a wire. Which of the following combination of length (L) and the area of cross-sectional (A) will lead to the smallest resistance

1. L and A
2. 2L and A/2
3. L/2 and 2A
4. Any of the above, because volume of silver remains same

Q32. The drift velocity of free electrons in a conductor is 'v' when a current 'i' is flowing in it. If both the radius and current are doubled, then drift velocity will be

1. v
2. $\frac{v}{2}$
3. $\frac{v}{4}$
4. $\frac{v}{8}$

Q33. An infinite ladder network is arranged with resistance R and 2R as shown. The effective resistance between terminals A and B is



1. ∞
2. R
3. 2R
4. 3R

Q34.Two identical conductors of copper and aluminum are placed in an identical electric fields. The magnitude of induced charge in the aluminum will be

1. Zero
2. Greater than in copper
3. Equal to that in copper
4. Less than in copper

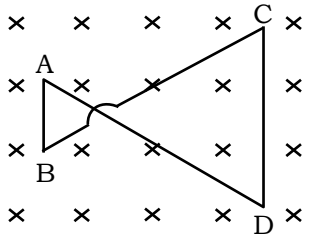
Q35.Two point charges 3×10^{-6} C and 8×10^{-6} C repel each other by a force of 6×10^{-3} N. If each of them is given an additional charge -6×10^{-6} C, the force between them will be

1. 2.4×10^{-3} N (attractive)
2. 2.4×10^{-9}N (attractive)
3. 1.5×10^{-3}N (repulsive)
4. 1.5×10^{-3}N (attractive)

Q36. Four equal charges Q are placed at the four corners of a square of each side is ‘a’. Work done in removing a charge –Q from its centre to infinity is

1. 0
2. $\frac{\sqrt{2}Q^2}{4\pi\varepsilon_0 a}$
3. $\frac{\sqrt{2}Q^2}{\pi\varepsilon_0 a}$
4. $\frac{Q^2}{2\pi\varepsilon_0 a}$

Q37. A conducting wire frame is placed in a magnetic field which is directed into the paper. The magnetic field is increasing at a constant rate. The directions of induced currents in wires AB and CD are



1. B to A and D to C
2. A to B and C to D
3. A to B and D to C
4. B to A and C to D

Q38. An inductor 'L' is allowed to discharge through a capacitor 'C'. The emf induced across the inductor, when the capacitor is fully charged, is

1. maximum
2. minimum
3. zero
4. infinite

Q39. An inductor coil having some resistance is connected to an ac source. Which of the following have zero average value over a cycle:

1. induced emf in the inductor
2. current
3. both 1 and 2
4. neither 1 or 2

Q40. Two concentric coils each of radius equal to $2\pi\,cm$ are placed at right angles to each other. 3 ampere and 4 ampere are the currents flowing in each coil respectively. The magnetic induction in Weber/m^2 at the centre of the coils will be $\left(\mu_0 = 4\pi \times 10^{-7} Wb/A.m\right)$

1. 5×10^{-5}
2. 7×10^{-5}
3. 12×10^{-5}
4. 10^{-5}

Q41. A proton (or charged particle) moving with velocity *v* is acted upon by electric field E and magnetic field B. The proton will move undeflected if

1. E is perpendicular to B
2. E is parallel to *v* and perpendicular to B
3. E, B and *v* are mutually perpendicular and $v = \frac{E}{B}$
4. E and B both are parallel to *v*

Q42. At a specific instant emission of radioactive compound is deflected in a magnetic field. The compound can emit

(i)Electrons

(ii) Protons

(iii)He^{2+}

(iv)Neutrons

The emission at the instant can be

1. i, ii, iii
2. i, ii, iii, iv
3. iv
4. ii, iii

Q43. If a cyclist moving with a speed of 4.9 m/s on a level road can take a sharp circular turn of radius 4 m, then coefficient of friction between the cycle tyres and road is

1. 0.41
2. 0.51
3. 0.61
4. 0.71

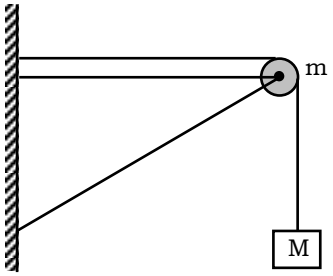
Q44. The maximum speed of a car on a road-turn of radius 30 m, if the coefficient of friction between the tyres and the road is 0.4, will be

1. 10.84 m/sec
2. 9.84 m/sec
3. 8.84 m/sec
4. 6.84 m/sec

Q45. Which of the following statements is false for a particle moving in a circle with constant angular speed

1. The velocity vector is tangent to the circle
2. The acceleration vector is tangent to the circle
3. The acceleration vector points to the centre of the circle
4. The velocity and acceleration vectors are perpendicular to each other

Q46. A string of negligible mass going over a clamped pulley of mass *m* supports a block of mass *M* as shown in figure. The force on the pulley by the clamp is given by

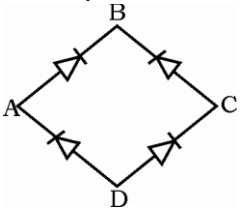


1. $\sqrt{2}$ Mg
2. $\sqrt{\{(M+m)^2 + m^2\}g}$
3. $\sqrt{2}$ mg
4. $\sqrt{\{(M+m)^2 + M^2\}g}$

Q47. Two blocks of masses 10kg and 4 kg are connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/sec to the heavier block in the direction of the lighter block. The velocity of the centre of mass is

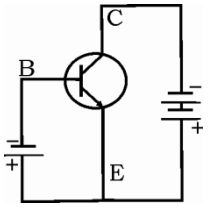
1. 30 m/sec
2. 20 m/sec
3. 10 m/sec
4. 5 m/sec

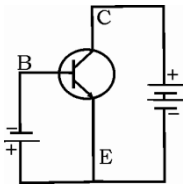
Q48. In the diagram, the a.c. input is connected across the terminals. A and C and the output is across B and D. Then the output is

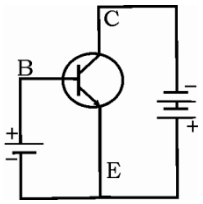


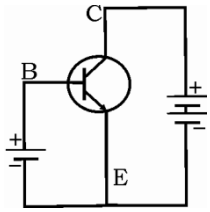
1. Zero
2. Same as the input
3. Half-wave rectified
4. Full-wave rectified

Q49. Which of the following circuits shows correct biasing of n-p-n transistor to operate as an amplifier in CE configuration ?

a. 

b. 

c. 

d. 

1. b
2. a
3. d
4. C

Q50. A p-n-p transistor in the common base mode has a dynamic input resistance of $75\,\Omega$. If the current gain of the amplifier is 0.98, find the voltage gain when the load resistance in the collector circuit is $7.5\,k\Omega$.

1. 49
2. 98
3. 980
4. 9800

Q51. The mass defect per nucleon is called

1. binding energy
2. packing fraction
3. ionization energy
4. excitation energy

Q52. Mass defect of an atom refers to

1. inaccurate measurement of mass of nucleons
2. mass annihiliated to produce energy to bind the nucleons
3. packing fraction
4. difference in the number of neutron and protons in the nucleus

Q53. Heavy water is used as a moderator in a nuclear reactor. The function of the moderator is

1. to control the energy released in the reactor
2. to absorb neutrons and stop the chain reaction
3. to cool the reactor
4. to slow down the neutron to thermal energies

Q54. Two wires A and B of same material and mass have their lengths in the ratio 1 : 2. On connecting them in parallel to the same source, the rate of heat dissipation in B is found to be 5W. The rate of heat dissipation in A is

1. 10W
2. 5W
3. 20W
4. None of these

Q55. Three electric bulbs of rating 60W each are joined in series and then connected to electric mains. The power consumed by these three bulbs will be

1. 180 W
2. 60 W
3. 20 W
4. $\frac{20}{3}$ W

Q56. The negative Zn pole of a Daniel cell, sending a constant current through a circuit, decreases in mass by 0.13 g in 30 minutes. If the electrochemical equivalent of Zn and Cu are 32.5 and 31.5 respectively, the increase in the mass of the positive Cu pole in this time is

1. 0.242 g
2. 0.190 g
3. 0.141 g
4. 0.126 g

Q57. The best combination of independent sources to produce sustained pattern among the following is

$$Y_1 = a\sin\omega t, \qquad Y_2 = a\cos\omega t$$

$$Y_3 = a\sin\left(\omega t + \frac{\pi}{4}\right), Y_4 = 2a\sin\ \omega t + \pi$$

1. Y_1, Y_2 only

2. Y_2, Y_3 only

3. Y_3, Y_4 only

4. none of these

Q58. If Young's interference experiment is performed using two separate identical sources of light instead of using two slits and one bulb, then

1. Interference fringes will be brighter

2. Interference fringes will be coloured

3. Interference fringes will be darker

4. No fringes will be obtained

Q59. A slit of width *d* is placed in front of a lens of focal length 0.5 m and is illuminated normally with light of wavelength 5.89×10^{-7} m. The first diffraction minima on either side of the central diffraction maximum are separated by 2×10^{-3} m. The width *d* of the slit is

1. 0.2945 mm

2. 2.945 mm

3. 29.45 mm

4. 294.5 mm

Q60 Interference fringes were produced in Young's double slit experiment using light of wavelength 5000Å. When a film of thickness 2.5×10^{-3} cm was placed in front of one of the slits, the fringe pattern shifted by a distance equal to 20 fringe-widths. The refractive index of the material of the film is

1. 1.5 2. 1.35

3. 1.4 4. 1.25

CHEMISTRY (Question 61-120)

Q61. The α –particles, passed through the gold foil, when strike the nucleus of Au atoms will

1. Be deflected at a obtuse angles
2. Be deflected at acute angles
3. Be deflected at a right angle
4. Not be deflected at all

Q62. The change in molar energy noticed during atomic transmission of 5 Hz frequency from a mono atomic molecule:

1. 33.1×10^{-34} J 2. 3.91×10^{-10} J

3. 1.99×10^{-9}J 4. 1.0×10^{-7}J

Q63. Bohr atomic model accurately predicts about

1. The spectrum of hydrogen atom only
2. The spectrum of an ion/atom containing one electron only
3. The spectrum of hydrogen molecule
4. The spectrum of all the atoms

Q64. The unit cell present in ABC ABC ___closest packing of atom is

1. Hexagonal 2. Tetragonal

3. Face centred cubic 4. Primitive cube

Q65. Frankel defect will be in found in those cases where

1. Size of cation is equal to anion

2. Limiting radius ratio is nearly equal to one

3. Coordination number is high

4. Coordination number is low

Q66. Which one of the following metal oxides is antiferromagnetic in nature?

1. MnO_2 2. TiO_2 3. CrO_2 4. VO_2

Q67. If water samples are taken from sea, rivers, clouds, lake or snow, they will be found to contain H_2 and O_2 in the approximate ratio of 1 : 8. This indicates the law of :

1. Multiple proportion

2. Definite proportion

3. Reciprocal proportion 4. None of above

Q68. In a compound A_xB_y :

1. Mole of A = Eq. of B + Eq. of A_xB_y

2. Eq. of A + Eq. of B = Eq. of A_xB_y

3. $y\times$ mole of $A + y \times$ mole of $B = x + y$ × mole of A_xB_y

4. y × mole of A = y× mole B

Q69. The pair of compounds which cannot exist in solution is :

1. $NaHCO_3$ and NaOH

2. Na_2SO_3 and $NaHCO_3$

3. Na_2CO_3 and NaOH

4. $NaHCO_3$ and NaCl

Q70. The outer orbit configuration of an element A is $ns^2\ np^3$. This element is unable to form molecule AF_5 because

1. There is no electron in d-orbital of element A
2. There is no d-orbital present in element A
3. There is large difference in the electronegativities of A and F
4. Molecule AF_5 is unstable

Q71. The correct order of bond length is

1. $C-C<C=C<C\equiv C$
2. $C\equiv C<C=C<C-C$
3. $C=C<C\equiv C<C-C$
4. $C=C<C-C<C\equiv C$

Q72. Dipole moment of KBr is 10.41 D and the bond length of KBr is 2.82 Å. The percentage ionic character of KBr will be [charge on the electron = 4.8×10^{-10} esu.]

1. 67.1
2. 77.1
3. 87.1
4. 89.7

Q73. The reaction A + 2B □ 2C + D was studied using an initial concentration of B which was 1.5 times that of A. But the equilibrium concentration of A and C were found to be equal. Then the K_c for the equilibrium is

1. 4
2. 2
3. 8
4. 0.32

Q74. The equilibrium $P_4\ g+6Cl_2\ g$ □ $4PCl_3\ g$ is attained by mixing equal moles of P_4 and Cl_2 in an evacuated vessel. Then at equilibrium

1. $Cl_2 > PCl_3$
2. $Cl_2 > P_4$
3. $P_4 > Cl_2$
4. $PCl_3 > P_4$

Q75. When $NaNO_3$ is heated in a closed vessel, O_2 is liberated and $NaNO_2$ is left behind. At equilibrium.

1. Addition of $NaNO_2$ favours reverse reaction.

2. Addition of $NaNO_3$ favours forward reaction.

3. Increasing temperature favours forward reaction.

4. Increasing pressure favours forward reaction.

Q76. Molarity of formic acid is

1. $\frac{1000}{1.22}$ 2. $\frac{10^{-6}}{1.22}$

3. 26.5 4. $\frac{10^{-3}}{1.22}$

Q77. The number of $HCOO^-$ present in 1 ml of the solution are :

1. $HCOO^-$ 2. 6.02×10^{17}

3. 6.02×10^{11} 4. 6.02×10^{34}

Q78. If solutions of HCOOH and CH_3COOH have equal pH and ratio of K_1/K_2 is 4 then ratio of their molar concentrations will be

1. 0.25 2. 0.5

4. 2 4. 4

Q79. Which of the following represents a redox reaction?

1. $NaOH + HCl \rightarrow NaCl + H_2O$

2. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

3. $CuSO_4 + 2H_2O \rightarrow Cu\ OH\ _2 + H_2SO_4$

4. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Q80. In the reaction,

$$2FeCl_3 + H_2S \rightarrow 2FeCl_2 + 2HCl + S$$

1. $FeCl_3$ acts as an oxidising agent
2. Both H_2S and $FeCl_3$ are oxidised.
3. $FeCl_3$ is oxidised while H_2S is reduced
4. H_2S acts as an oxidising agent.

Q81. The value of x in

$$2IO_3^- + xI^- + 12H^+ \rightarrow 6I_2 + 6H_2O$$ is

1. 2 2. 12
3. 6 4. 10

Q82. Vapour pressure of benzene and Toluene mixture at 327 K are given by P = 179 X_B + 92.Where X_B is the mole fraction of C_6H_6. The vapour pressure of pure toluene is

1. 271 mm 2.199.4 mm
3. 92 mm 4.82 mm

Q83. A 0.001 molal solution of $\left[Pt\ NH_3\ _4\ Cl_4\right]$ in water had a freezing point depression of 0.0054^oC. If K_f for water is 1.80, the correct formulation for the above molecule is

1. $\left[Pt\ NH_3\ _4\ Cl_3\right]Cl$
2. $\left[Pt\ NH_3\ _4\ Cl_2\right]Cl_2$
3. $\left[Pt\ NH_3\ _4\ Cl\right]Cl_3$
4. $\left[Pt\ NH_3\ _4\ Cl_4\right]$

Q84. A maxima or minima obtained in the temperature composition curve of a mixture of two liquids indicates

1. An azeotropic mixture

2. An eutectic formation

3. That the liquids are immiscible with one another

4. That the liquids are partially miscible at the maximum or minimum

Q85. On increasing the temperature by 10K, the rate of reaction becomes double. Which of the following is the most appropriate reason?

1. With increase of temperature, velocities increase and hence the number of collisions are appreciably increased.

2. The activation energy decreases with increase of temperature.

3. The bonds between the atoms of the reacting molecules become weak at higher temperature

4. The higher the temperature, larger is the fraction of colliding particles which can cross the energy barrier.

Q86. If 'a' is the initial concentration and K is the rate constant of a zero order reaction, the time for the reaction to go to completion will be

1. $\frac{K}{2a}$ 2. $\frac{a}{2K}$

3. $\frac{a}{K}$ 4. $\frac{K}{a}$

Q87. The reaction $A \rightarrow B$ follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. What is the time taken for conversion of 0.9 mole of A to produce 0.675 mole of B?

1. 1 hour 2. 0.5 hour

3. 0.25 hour 4. 2 hours

Q88. In which of the following process, platinum is used as catalyst?

1. Oxidation of ammonia to form nitric acid

2. Hardening of oils

3. Production of synthetic rubber

4. Synthesis of methanol

Q89. Which one of the following is an example of negative catalysis?

1. Oxidation of SO_2 to SO_3 in presence of V_2O_5

2. Combination of N_2 and H_2 to from NH_3 in presence of iron.

3. Decomposition of H_2O_2 in presence of phosphoric acid

4. Oxidation of NH_3 in presence of platinum

Q90. ZSM-5 converts :

1. Alcohol to petrol
2. Benzene to toluene
3. Toluene to benzene
4. Heptane to toluene

Q91. Which organic structure among the following is not an isomer of the compound $CH_3–CO–CH_2CH_2CH_2CH_3$?

1. $CH_3CH_2OCH=CHCH_2CH_3$

2. $CH_3CH=CHCH_2CH_2CHO$

3. $(CH_3)_2CH–CO–CH_2CH_3$

4. $CH_3CH_2COCH_2CH_2CH_3$

Q92. Which of the following compounds will show metamerism?

1. $CH_3–CO–C_2H_5$
2. $C_2H_5–S–C_2H_5$
3. $CH_3–O–CH_3$
4. $CH_3–O–C_2H_5$

Q93. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y \xrightarrow[\text{anhydride}]{\text{Acetic}} Z$ Z in the above reacting sequence is

1. $CH_3CH_2CH_2NHCOCH_3$

2. $CH_3CH_2CH_2NH_2$

3. $CH_3CH_2CH_2CONHCH_3$

4. $CH_3CH_2CH_2CONHCOCH_3$

Q94. Which of the following statement is not correct for ketone and acetaldehyde

1. Both form cyanohydrin when reacted with HCN
2. Both form acids when oxidized
3. Both form alcohol on reduction
4. Both form aldol on reaction with NaOH

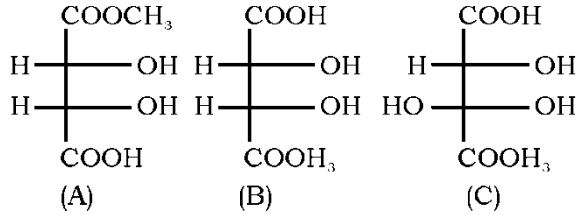
Q95. The enol form of acetone, after treatment with D_2O gives

1. $CH_3-\overset{\overset{OD}{|}}{C}=CH_2$
2. $CD_3-\overset{\overset{O}{\|}}{C}-CD_3$
3. $CH_2=\overset{\overset{OH}{|}}{C}-CH_2D$
4. $CD_2=\overset{\overset{OD}{|}}{C}-CD_3$

Q96. 4. Phenol and acetone The example of condensation polymerization is

1. Formaldehyde $\rightarrow$ Meta formaldehyde
2. Acetaldehyde $\rightarrow$ Para acetaldehyde
3. Acetone $\rightarrow$ Mesityl oxide
4. Ethene $\rightarrow$ Polyethene

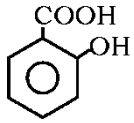
Q97. The correct statement about the compounds A, B and C is



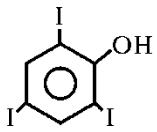
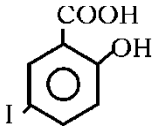
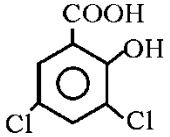
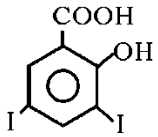
1. A and B are identical
2. A and B are diastereomers
3. A and C are enantiomers
4. A and B are enantiomers

Q98. A liquid (X) having a molecular formula $C_6H_{12}O_2$ is hydrolysed with water in the presence of an acid to give a carboxylic acid (Y) and an alcohol (Z). Oxidation of (Z) with chromic acid gives (Y). The structure of (X) is

1. $CH_3CH_2COOCH(CH_3)_2$
2. $CH_3CHCOOCH_3$
3. $CH_3CH_2COOCH_2CH_2CH_3$
4. $CH_3COOCH_3CH(CH_3)_2$

Q99.  + ICl ⟶ 'Product'

The product is

1. 
2. 
3. 
4. 

Q100. Which is an example of thermosetting polymer ?

1. Polythene
2. PVC
3. Neoprene
4. Bakelite

Q101. Starch is

1. $C_6H_{10}O_5$
2. $(C_6H_{10}O_5)_n$
3. $C_{12}H_{22}O_{11}$
4. $(C_6H_{12}O_6)_n$

Q102. Morphine is used as an

1. Antipyretic
2. Antiseptic
3. Analgesic
4. Insecticide

Q103. Which of the series of elements listed below would have nearly the same atomic radii

1. F, Cl, Br, I 2. Na, K, Rb, Cs

3. Li, Be, B, C 4. Fe, Co, Ni, Cu

Q104. The statement that is not correct for the periodic classification of elements is:

1. The properties of elements are periodic functions of their atomic numbers

2. Non–metallic elements are lesser in number than metallic elements

3. The first ionization energies of the elements along the period do not vary in a regular manner with the increase in atomic number

4. For transition elements the *d*–subshells are filled with electrons monotonically with increase in atomic number

Q105. The incorrect statement among the following is:

1. The first ionization potential of Al is less than the first ionisation potential of Mg

2. The second ionisation potential of Mg is greater than the second ionisation potential of Na

3. The first ionisation potential of Na is less than the first ionisationi potential of Mg

4. The third ionisation potential of Mg is greater than third ionisation potential of Al

Q106. The impurities present in the mineral are called

1. Flux 2. Gangue

3. Alloy 4. Slag

Q107. In the manufacture of iron from haematite, limestone is added to act as

1. Flux

2. Slag

3. A reducing agent

4. An oxidizing agent

Q108. The incorrect statement is

1. Calamine and siderite are carbonates

2. Argentite and cuprite are oxides

3. Zinc blende and iron pyrites are sulphides

4. Malachite and azurite are ores of copper

Q109. Calcium is extracted by the electrolysis of

1. Fused mixture of $CaCl_2$ and CaF_2

2. $CaCl_2$ solution

3. Fused mixture of $CaCl_2$ and NaF

4. $Ca_3 (PO_4)_2$ solution

Q110. In cement, lime is provided by heating

1. $Ca(OH)_2$ 2. $CaCO_3$

3. $CaSO_4$ 4. Clay

Q111. BeF_2 is soluble in water, whereas, the fluorides of other alkaline earth metals are insoluble because of

1. Ionic nature of BeF_2

2. Greater hydration energy of Be^{2+} ion as compared to crystal lattice energy.

3. Covalent nature of BeF_2

4. None of these

Q112. Which one of the following is most abundant on the earth crust ?

1. Al 2. B

3. Ba 4. Bi

Q113. The blue coloured mineral 'Lapis Lazuli' which is used as a semi-precious stone is a mineral of the following class

1. sodium alumino silicate

2. zinc cobaltate

3. basic copper carbonate

4. prussian blue

Q114. Which of the following is not isomorphous with true alum and is called pseudo alum ?

1. $FeSO_4.Al_2\ SO_4\ _3.24H_2O$

2. $K_2SO_4.Al_2\ SO_4\ _3.24H_2O$

3. $K_2SO_4.Cr_2\ SO_4\ _3.24H_2O$

4. $NH_4\ _2SO_4.Fe_2\ SO_4\ _3.24H_2O$

Q115. When a large amount of $KMnO_4$ is added to concentrated H_2SO_4, an explosive compound is formed. The formula of the compound is

1. Mn_2O_7 2. Mn_3O_4
3. MnO_3 4. MnO_3^+

Q116. Which of the following statement is false

1. rusting of iron can be stopped by acidic water
2. rusting of iron is electrochemical process
3. rusting of iron takes place in moist air
4. rusting of iron produces hydrated Fe_2O_3

Q117. Sodium nitroprusside gives violet colour with sulphide ions the formula of the violet coloured compound is

1. $Na_2\left[Fe\ NO\ \ CNS\ _5\right]$
2. $H_3\left[Fe\ CN\ _6\right]$
3. $Na_4\left[Fe\ NOS\ \ CN\ _6\right]$
4. $Na_4\left[Fe\ NOS\ \ CN\ _5\right]$

Q118. All ligands are

1. Lewis acids 2. Lewis bases
3. Neutral 4. None of these

Q119. Ionisation isomerism is shown by

1. $\left[Pt\ NH_3\ _4\ Cl_2\right]Br_2$ and $\left[Pt\ NH_3\ _4\ Br_2\right]Cl_2$

2. $\left[Cu\ NH_3\ _4\right]\ PtCl_4$ and $\left[Pt\ NH_3\ _4\right]\ CuCl_4$

3. $\left[Co\ NH_3\ _5\ NO_2\right]Cl_3$ and $\left[Co\ NH_3\ _5\ ONO\right]Cl_3$

4. $\left[Pt\ NH_3\ _2\ Cl_2\right]$ and $\left[Pt\ NH_3\ _4\right]\ PtCl_4$

Q120. Zeise's salt is

1. $C_2H_4PtCl_3^{\ +}\ Cl^-$ 2. $Ni\ CO\ _4$

3. $CuSO_4.5H_2O$ 4. $FeSO_4.7H_2O$

Mathematics (Questions 121 – 200)

Q121. The quadratic equations

$x^2 - 6x + a = 0$

and $x^2 - cx + a = 0$

have one root in common. The other roots of the first and second equations are integers in the ratio 4 : 3. Then the common root is

1. 3

2. 2

3. 1

4. 4

Q122. If a is a negative, then the number of solution of the equation $x^2 - 4a\,|\,x - a\,| - a^2 = 0$, is equal to

1. zero 2. three
3. two 4. four

Q123. The solution of $6 + x - x^2 > 0$ is

1. $-1 < x < 2$
2. $-2 < x < 3$
3. $-2 < x < -1$
4. none of these

Q124. The region of Argand diagram defined by $|z-1|+|z+1| \leq 4$ is

1. interior of an ellipse
2. exterior of a circle
3. interior and boundary of an ellipse
4. none of these

Q125. If $\omega = \dfrac{z}{z - \frac{1}{3}i}$ and $|\omega| = 1$, then z lies on

1. a parabola
2. a st. line
3. a circle
4. an ellipse

Q126. If $2 + i\sqrt{3}$ is a root of the equation $x^2 + px = q$ where p and q are real numbers then

1. $p = 4$
2. $q = -7$
3. $p = -9$
4. $q = 7$

Q127. If $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix} = x + iy,$ then

1. $x = 3, y = 1$

2. $x = 1, y = 3$

3. $x = 0, y = 3$

4. $x = 0, y = 0$

Q128.The coefficient of middle term in the expansion of $(1 + x)^n$, when n is even, is

1. $\frac{1.3.5....n}{2.4.6....(n+1)}2^n$

2. $\frac{1.3.5....(n-1)}{2.4.6....n}2^n$

3. $(\sqrt{3} + \sqrt[8]{5})^{256}$

4. None of these

Q129. The sum of the series

$^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 -$

$C + ... - .... + {}^{20}C_{10}$ is

1. $\frac{1}{2}{}^{20}C_{10}$

2. 0

3. $^{20}C_{10}$

4. $-{}^{20}C_{10}$

Q130. If $(a + bx)^{-2} = \frac{1}{4} - 3x + ……$, then (a, b) =

1. (2, 12)

2. (– 2, 12)

3. (2, – 12)

4. None of these

Q131. The number of ways in which a mixed double game can be arranged from amongst n couples such that no husband and wife play in the same game, is

1. $6 \cdot {}^nC_4$

2. $(1/2) \cdot {}^{n}P_4$

3. ${}^{n-2}P_4$

4. 2n!/n!

Q132.There are 2 points on a line, 3 points on another line and 4 points on yet another line. The total number of triangles that can be formed by joining these points, is

1. 30
2. 205
3. 79
4. 85

Q133.The value of $^{50}C_4 + \sum_{r=1}^{6} {}^{56-r}C_3$ is

1. $^{56}C_4$

2. $^{56}C_5$

3. $^{55}C_3$

4. $^{55}C_4$

Q134.The minimum value of $4^x + 4^{1-x}$, $x \in R$ is

1. 2

2. 1

3. 3

4. 4

Q135.If 1, $\log_9(3^{1-x}+2)$, $\log_3(4\cdot 3^x - 1)$ are in A.P., then *x* equal to

1. $\log_4 3$

2. $\log_3 (0.75)$

3. $1 + \log_3 4$

4. None of these

Q136. Fifth term of a G.P. is 2, then the product of its 9 terms is :

1. 256
2. 512
3. 1024
4. none of these

Q137. $1 + \frac{2}{1.2.3} + \frac{2}{3.4.5} + \frac{2}{5.6.7} + \ \ldots =$

1. 2 $\text{Log}_e 4$
2. 2 $\text{Log}_e 2$
3. 2 $\text{Log}_e 3$
4. None of these

Q138. If x ≠ 0, then the sum of the series

$$1 + \frac{x}{2!} + \frac{2x^2}{3!} + \frac{3x^3}{4!} + \ \ldots to \infty, is$$

1. $(e^x + 1)/x$
2. $e^x(x - 1)/x$
3. $e^x(x - 1) + 1/x$
4. None of the above

Q139. $\frac{1}{2}x^2 + \frac{2}{3}x^3 + \frac{3}{4}x^4 + \frac{4}{5}x^5 + \ \ldots is$

1. –(x/(1+x)) Log(1+x)
2. (x/(1+x)) + Log(1+x)
3. (x/(1+x)) + Log(1-x)
4. None of the above

Q140. $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \ \ldots is$

1. 2 Log 2 – 1
2. 3 Log 2
3. 4 Log 2 + 1

4. None of the above

Q141. One card is drawn at random from an ordinary deck of well-shuffled cards. The probability that the card drawn will be either spaded or an ace, is

1. $17/52$
2. 17/26
3. 4/13
4. none of these

Q142. A man is known to speak the truth in 75% cases. He throws a die and reports that it is a five. The probability that it is actually a five is

1. $\frac{3}{8}$
2. $\frac{3}{4}$
3. $\frac{1}{5}$
4. none of these

Q143. A bag contains 7 tickets marked with numbers 0, 1, 2, 3, 4, 5, and 6. One ticket is drawn and replaced. Probability that after 4 drawings the sum of the numbers drawn, will be exactly 8, is

1. $\frac{149}{2401}$
2. $\frac{157}{2401}$
3. $\frac{147}{2401}$
4. none of these

Q144. Five horses are in a race. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is :

1. $\frac{4}{5}$
2. $\frac{3}{5}$
3. $\frac{1}{5}$
4. $\frac{2}{5}$

Q145. A random variable X has Poisson distribution with mean 2. Then $P(X > 1.5)$ equals :

1. $\frac{3}{e^2}$
2. $1 - \frac{3}{e^2}$
3. 0
4. $\frac{2}{e^2}$

Q146. If $A = \begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ and $B = \begin{bmatrix} a^2 & ab & ac \\ ab & b^2 & bc \\ ac & bc & c^2 \end{bmatrix}$ then AB =

1. B
2. A
3. O
4. I

Q147. If a, b, c are the pth, qth, rth terms of G.P., then $\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} =$

1. 0
2. 1
3. -1
4. None of these

Q148. The determinant $\begin{vmatrix} a & b & ap+b \\ b & c & bp+c \\ ap+b & bp+c & 0 \end{vmatrix} = 0,$ if

1. a, b, c are in A.P.
2. a, b, c are in G.P.
3. a, b, c are in H.P.
4. None of these

Q149. If the system of linear equations

$x + 2ay + az = 0$

$x + 3by + bz = 0$

$x + 4cy + cz = 0$

has a non-zero solution, then a, b, c

1. are in A.P.

2. are in G.P.

3. are in H.P.

4. satisfy $a + 2b + 3c = 0$

Q150. If f(x) = max (sin x, cos x) $x \in [0, 2\pi]$, then the number of points at which f(x) is non differentiable

1. 1 2. 0

3. 2 4. 3

Q151. Given n(U) = 20, n (A) = 12, n(B) = 9, n(A∩B) = 4 where U is the universal set, A and B are subsets of U, then $n(AUB)^C$ =

1. 17
2. 9
3. 11
4. 3

Q152. The value of $\lim_{x \to \infty} \left[\frac{2x - 3\ (3x + 5)(4x - 6)}{3x^3 + x - 1} \right]$ is

1. 2

2. 1

3. 8

4. does not exist

Q153.The value of $\lim_{x \to 0} \frac{a^x - b^x}{x}$ is

1. log (a/b)

2. log (b/a)

3. log (ab)

4. 0

Q154.The values of $\lim_{x\to 0} \frac{x^2 - 2x}{2\sin x}$ is

1. 1

2. 2

3. –1

4. 3

Q155. $\lim_{x\to 0} \frac{1-\cos^3 x}{x \sin x \cos x}$ equals

1. ¼

2. 1

3. 3/2

4. does not exist

Q156.Let α and β be the distinct roots of $ax^2 + bx + c = 0,$ then

$\underset{x\in a}{Lt} \frac{1-\cos\ ax^2 + bx + c}{x - a\ ^2}$ is equal to

1. $-\frac{a^2}{2}\ \alpha - \beta\ ^2$

2. $\frac{1}{2}\ \alpha - \beta\ ^2$

3. $\frac{a^2}{2}\ \alpha - \beta\ ^2$

4. 0

Q157.The function $f : R / 0 \to R$ given by

$f\ x\ = \frac{1}{x} - \frac{2}{e^{2x} - 1}$

can be made continuous at x = 0 by defining f(0) as

1. –1

2. 0

3. 1

4. 2

Q158.Let $f\ x\ = \frac{1-\tan x}{4x-\pi}, x \neq \frac{\pi}{4}, x \in \left[0, \frac{\pi}{2}\right]$,

f(x) is continuous in $\left[0, \frac{\pi}{2}\right]$, then $f\left(\frac{\pi}{4}\right)$ is

1. $-\frac{1}{2}$

2. $\frac{1}{2}$

3. 1

4. -1

Q159.If $\lim_{n\to\infty}\left(a_n - \frac{1+n^2}{1+n}\right) = b$, a finite number, then

1. a = 1

2. a = 0

3. b = 1

4. b = – 1

Q160.Let $f'\ x\ = \left[e^x\ x-1\ \ x-2\ \right]$. Then f decreases in the interval :

1. $-\infty, -2$

2. $-2, -1$

3. $1, 2$

4. $2, +\infty$

Q161.Function $f\ x\ = \frac{\lambda \sin x + 6\cos x}{2\sin x + 3\cos x}$ is monotonically increasing if :

1. $\lambda > 1$
2. $\lambda < 1$
3. $\lambda < 4$
4. $\lambda > 4$

Q162. The greatest distance of the point P (10, 7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ is :

1. 10
2. 15
3. 5
4. none of these

Q163. In a triangle ABC, $\angle B = 90^\circ$ and b + a = 4. The area of the triangle is the maximum when $\angle C$ is

1. $\pi/4$
2. $\pi/6$
3. $\pi/3$
4. None of these

Q164. $\int \frac{dx}{x\ x^n + 1}$ is equal to:

1. $\frac{1}{n}\log\left(\frac{x^n}{x^n + 1}\right) + c$
2. $\frac{1}{n}\log\left(\frac{x^n + 1}{x^n}\right) + c$
3. $\log\left(\frac{x^n}{x^n + 1}\right) + c$
4. None of these

Q165.If $f(x) = \int_{x^2}^{x^2+1} e^{-t^2} dt,$ find the interval in which f (x) is increasing:

1. $0, \infty$
2. $-\infty, 0$
3. $-2, 2$
4. No where

Q166. The area bounded by the curve $y = 2x = x^2$ and the st. line $y = -x$ is given by

1. $\frac{9}{2}$
2. $\frac{43}{6}$
3. $\frac{35}{6}$
4. none of these

Q167. The value of $\int_{-2}^{3} |1 - x^2| dx$ is

1. $\frac{28}{3}$
2. $\frac{14}{3}$
3. $\frac{7}{3}$
4. $\frac{1}{3}$

Q168.The degree and order of the differential equation of the family of all parabolas whose axis is x-axis, are respectively

1. 2, 1
2. 1, 2
3. 3, 2

4. 2, 3

Q169.If $x\frac{dy}{dx} = y\ \log y - \log x + 1$, then the solution of the equation is

1. $\log\left(\frac{x}{y}\right) = cy$

2. $\log\left(\frac{y}{x}\right) = cx$

3. $x\log\left(\frac{y}{x}\right) = cy$

4. $y\log\left(\frac{x}{y}\right) = cx$

Q170.The solution of primitive integral equation $(x^2 + y^2)dy = xy\ dx$ is $y = y(x)$. If $y(1) = 1$ and $(x_0) = e$, then x_0 is equal to

1. $\sqrt{2(e^2 - 1)}$

2. $\sqrt{2(e^2 + 1)}$

3. $\sqrt{3}\ \ e$

4. $\sqrt{\frac{e^2 + 1}{2}}$

Q171.The lines $x + \ a - 1\ y + 1 = 0 \text{and} 2x + a^2y - 1 = 0$ are perpendicular if:

1. $|a| = 2$

2. $0 < a < 1$

3. $-1 < a < 0$

4. $a = -1$

Q172.The points $-a, -b\ ,\ 0,0\ ,\ a,b$ and a^2, ab are

1. collinear

2. vertices of a rectangle

3. vertices of a parallelogram

4. none of these

Q173.If non-zero numbers a, b, c are in H.P., then the st. line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes thro' a fixed point. That point is

1. $\left(1,-\frac{1}{2}\right)$
2. $1,-2$
3. $-1,-2$
4. $-1,2$

Q174.Let PQ and RS be tangents at the extremities of the diameter PR of a circle of radius r. If PS and RQ intersect at a pt. X on the circumference of the circle, then 2r equals:

1. $\sqrt{PQ.\ RS}$
2. $\frac{PQ+RS}{2}$
3. $\frac{2PQ.\ RS}{PQ+RS}$
4. $\sqrt{\frac{PQ^2+RS^2}{2}}$

Q175. Let AB be a chord of the circle $x^2+y^2=r^2$ subtending a right angle at the centre. Then the locus of the centroid of triangle PAB as P moves on the circle is:

1. a parabola
2. a circle
2. an ellipse
4. a par of st. lines

Q176.If the lines $2x+3y+1=0$ and $3x-y-4=0$ lie along diameters of a circle of circumference 10π, then the equation of the circle is

1. $x^2+y^2+2x+2y-23=0$

2. $x^2 + y^2 - 2x - 2y - 23 = 0$
3. $x^2 + y^2 - 2x + 2y - 23 = 0$
4. $x^2 + y^2 + 2x - 2y - 23 = 0$

Q177.The length of the latus-rectum of the parabola:

$$169\ \ x-1\ ^2+\ y-3\ ^2\ =\ 5x-12y+17\ ^2\ \text{is}:$$

1. $\frac{12}{13}$
2. $\frac{14}{13}$
3. $\frac{28}{13}$
4. $\frac{25}{13}$

Q178.If $x + y = k$ is normal to $y^2 = 12x,$ then k is:

1. 3
2. 9
3. –9
4. –3

Q179.The length of the chord of the parabola $y^2 = 4ax$ passing through the vertex and making an angle θ with the axis is

1. $4a\ \mathrm{cosec}^2\theta$
2. $4a\cos\theta\ \mathrm{cosec}^2\theta$
3. $4a\cot\theta\ \mathrm{cosec}^2\theta$
4. $2a\ \mathrm{cosec}^2\theta$

Q180.The equation $\frac{x^2}{10-a}+\frac{y^2}{4-a}$=1 represents an ellipse, if

1. a < 4
2. a > 4
3. 4 < a < 10
4. a > 10

Q181.If the normal at one end of the latus rectum of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ passes through the one end of the minor axis, then

1. $e^4-e^2+1=0$
2. $e^2-e+1=0$
3. $e^2+e+1=0$
4. $e^4+e^2-1=0$

Q182.If θ and ϕ are eccentric angels of the ends of a pair of conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, then $\theta-\phi$ is equal to

1. $\pm\pi/2$
2. $\pm\pi$
3. 0
4. none of these

Q183.The locus of a point $P\ \alpha,\beta$ moving under the condition that the line $y=\alpha x+\beta$ is a tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

1. a parabola
2. a hyperbola
3. an ellipse
4. a circle

Q184.If $u = \sqrt{a^2\cos^2\theta + b^2\sin^2\theta} + \sqrt{a^2\sin^2\theta + b^2\cos^2\theta}$,

then the difference between the maximum and minimum values of u^2 is given by :

1. $2\ a^2 + b^2$
2. $2\sqrt{a^2 + b^2}$
3. $a + b\ ^2$
4. $a - b\ ^2$

Q185.In ΔABC, $\cos A + \cos B + \cos C > 1$ only if the triangle is :

1. acute-angled
2. right-angled
3. obtuse-angled
4. nothing can be said about the nature of the triangle

Q186. The value of x for which $\sin\ \cot^{-1}\ 1 + x\ = \cos\ \tan^{-1} x$ is :

1. $\frac{1}{2}$
2. 1
3. 0
4. $\frac{-1}{2}$

Q187.A flagstaff stands vertically on a pillar, the height of the flagstaff being double the height of the pillar. A man on the ground at a distance x finds that both the pillar and the flagstaff subtend equal angles at his eye. The ratio of the height of the pillar and the distance of the man from the pillar is :

1. 1 : 3
2. $1 : \sqrt{3}$
3. $\sqrt{3} : 1$
4. $\sqrt{3} : 2$

Q188.If $\tan\theta = -\frac{4}{3}$ then $\sin\theta$ is :

1. $-\frac{4}{5}$ but not $\frac{4}{5}$
2. $-\frac{4}{5}$ or $\frac{4}{5}$
3. $\frac{4}{5}$ but not $-\frac{4}{5}$
4. none of these

Q189. α, β, γ are real numbers satisfying $\alpha + \beta + \gamma = \pi$. The minimum value of given expression $\sin\alpha + \sin\beta + \sin\gamma$ is

1. Zero
2. -3
3. Positive
4. Negative

Q190. A man from the top of a 100 metre high tower sees a car moving towards the tower at an angle of depression of 30°. After sometimes, the angle of depression becomes 60°. The distance (in metres) traveled by car during this time is

1. $100\sqrt{3}$
2. $\frac{200\sqrt{3}}{3}$
3. $\frac{100\sqrt{3}}{3}$
4. $200\sqrt{3}$

Q191. If p_1 and p_2 are the lengths of the perpendiculars from the points $2, 3, 4$ and $1, 1, 4$ respectively from the plane $3x - 6y + 2z + 11 = 0$, then p_1, p_2 are the roots of the equation

1. $p^2 - 23p + 7 = 0$
2. $7p^2 - 23p + 16 = 0$
3. $p^2 - 17p + 16 = 0$
4. $p^2 - 16p + 7 = 0$

Q192. The angle between the lines $2x - 3y = -z$ and $6x = -y = -4z$ is

1. 0°

2. 30°

3. 45°

4. 90°

Q193.If the vectors $\vec{a},\vec{b}\text{ and }\vec{c}$ form the sides BC, CA and AB respectively of triangle ABC, then

1. $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}=0$

2. $\vec{a}\times\vec{b}=\vec{b}\times\vec{c}=\vec{c}\times\vec{a}$

3. $\vec{a}.\vec{b}=\vec{b}.\vec{c}=\vec{c}.\vec{a}$

4. $\vec{a}\times\vec{b}+\vec{b}\times\vec{c}\times\vec{a}=\vec{0}$

Q194.Given two vectors $\vec{i}-\hat{j}\text{ and }\vec{i}+2\vec{j}.$ The unit vector coplanar with the two given vectors and $\perp$ to the first is

1. $\frac{1}{\sqrt{2}}\ \vec{i}+\vec{j}$

2. $\frac{1}{\sqrt{5}}\ 2\vec{i}+\vec{j}$

3. $\pm\frac{1}{2}\ \vec{i}+\vec{j}$

4. none of these

Q195.The line $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar if :.

1. $k=0\text{ or }-1$

2. $k=1\text{ or }-1$

3. $k=0\text{ or }-3$

4. $k=3\text{ or }-3$

Q196.Let $\bar{a}=\hat{i}+\hat{j}+\bar{k},\bar{b}=\hat{i}-\hat{j}+2\bar{k}$ and $\bar{c}=x\hat{i}+\ x-2\ \hat{j}-\bar{k}.$ If the vector $\bar{c}$ lies in the plane of $\bar{a}$ and $\bar{b},$ then x equal

1. 1

2. 4

3. 2

4. 0

Q197.The plane $x+2y-z=4$ cuts the sphere $x^2+y^2+z^2-x+y-2=0$ in a circle of radius

1. $\sqrt{2}$
2. 2
3. 1
4. 3

Q198.The image of the point $-1,3,4$ in the plane $x-2y=0$

1. $8,4,4$
2. $\left(\frac{9}{5},\frac{-13}{5},4\right)$
3. $15,11,4$
4. $\left(\frac{-17}{3},\frac{-19}{3},1\right)$

Q199. The plane which passes thro' the point (3, 2, 0) and the line $\frac{x-3}{1}=\frac{y-6}{5}=\frac{z-4}{4}$ is.

1. $x-y+z=1$
2. $x+y+z=5$
3. $x+2y-z=1$
4. $2x-y+z=5$

Q200.The angle between the lines $2x=3y=-z$ and $6x=-y=-4z$ is

1. 30°
2. 45°
3. 90°
4. 0°