MOCK TEST PAPER 5

General Instructions: *Same as Mock Test Paper 1.*

Physics

Section A

Q. 1. If energy (E), velocity (V) and force (F), be taken as fundamental quantities, then what are the dimensions of mass ?

(1) $[EV^2]$ **(2)** $[EV^{-2}]$

(3) $[FV^{-1}]$ **(4)** $[FV^{-2}]$

Q. 2. A body starts from rest with constant acceleration a, its velocity after n second is v. The displacement of body in last two seconds is :

(1) $\frac{2v(n-1)}{n}$ **(2)** $\frac{v(n-1)}{n}$

(3) $\frac{v(n+1)}{n}$ **(4)** $\frac{2v(n+1)}{n}$

Q. 3. Work done in converting one gram of ice at –10°C into steam at 100°C is :

(1) 3045 J **(2)** 6056 J

(3) 721 J **(4)** 616 J

Q. 4. Which of the following quantities is zero on an average for the molecules of an ideal gas in equilibrium ?

(1) Kinetic energy **(2)** Momentum

(3) Density **(4)** Speed

Q. 5. A gas is compressed at a constant pressure of 50 N/m^2 from a volume of 10 m^3 to a volume of 4 m^3. Energy of 100 J is then added to the gas by heating. Its internal energy is :

(1) Increased by 400 J

(2) Increased by 200 J

(3) Increased by 100 J

(4) Decreased by 200 J

Q. 6. Two rectangular blocks A and B of different metals have same length and same area of cross-section. They are kept in such a way that their cross-sectional area touch each other. The temperature at one end of A is 100°C and that of B at the other end is 0°C. If the ratio of their thermal conductivity is 1 : 3, then under steady state, the temperature of the junction in contact will be :

(1) 25°C **(2)** 50°C

(3) 75°C **(4)** 100°C

Q. 7. An anisotropic material has coefficient of linear thermal expansion α_1, α_2 and α_3 along x, y and z–axis respectively. Coefficient of cubical expansion of its material will be equal to :

(1) $\alpha_1 + \alpha_2 + \alpha_3$ **(2)** $\alpha_1 + 2\alpha_2 + 3\alpha_3$

(3) $3\alpha_1 + 2\alpha_2 + \alpha_3$ **(4)** $\frac{\alpha_1+\alpha_2+\alpha_3}{3}$

Q. 8. Two strings A and B, made of same material are stretched by same tension. The radius of string A is double of the radius of B. A transverse wave travels on A with speed v_A and on B with speed v_B. The ratio $\frac{v_A}{v_B}$ is :

(1) $\frac{1}{2}$ **(2)** 2 **(3)** – **(4)** 4

Q. 9. The road at a circular turn of radius 10 m is banked by an angle of 10′. With what speed should a vehicle move on the turn so that the normal contact force in able to provide the necessary centripetal force.

[tan 10′ = 0.176]

(1) 4.0 m/s **(2)** 3.8 m/s

(3) 2.4 m/s **(4)** 4.2 m/s

Q. 10. The period of revolution of a certain planet in an orbit of radius R is T. Its period of revolution in an orbit or radius 4R will be:

(1) 2 T **(2)** T **(3)** 4 T **(4)** 8 T

Q. 11. The value of series limit in the case of paschen series is :

(1) 1875 nm **(2)** 122 nm

(3) 822 nm **(4)** tending to zero

Q. 12. A small Satellite is revolving near Earth's surface. Its orbital velocity will be nearly.

(1) 8 km/s **(2)** 11.2 km/s

(3) 4 km/s **(4)** 6 km/s

Q. 13. If the frequency of light in a photoelectric experiment is doubled, the stopping potential will :

(1) be doubled

(2) be halved

(3) become more than double

(4) become less than double

Q. 14. The magnitude of the magnetic field produced by a short bar magnet at a distance of 20 cm from the centre of the magnet in the normal bisector of the magnet. If found to be 5×10^{-6} T. The magnetic moment of the bar magnet is :

(1) $0.1\ JT^{-1}$ **(2)** $0.4\ JT^{-1}$

(3) $0.6\ JT^{-1}$ **(4)** $1.2\ JT^{-1}$

Q. 15. A point object is placed at a distance of 30 cm from a convex mirror of focal length 30 cm. What is the separation between the image and the object?

(1) 40 cm **(2)** 45 cm

(3) 50 cm **(4)** 55 cm

Q. 16. A glass slab of thickness 4 cm contains the same number of waves as 5 cm of water. When both are traversed by the same monochromatic light. If the refractive index of water is $\left(\frac{4}{3}\right)$. What is that of glass ?

(1) $\frac{5}{3}$ **(2)** $\frac{5}{4}$ **(3)** $\frac{16}{15}$ **(4)** 1.5

Q. 17. The maximum value of index of refraction of a material of a prism which allows the passage of light through it when the refracting angle of the prism is A is :

(1) $\sqrt{1+\sin\left(\frac{A}{2}\right)}$ **(2)** $\sqrt{1+\cos\left(\frac{A}{2}\right)}$

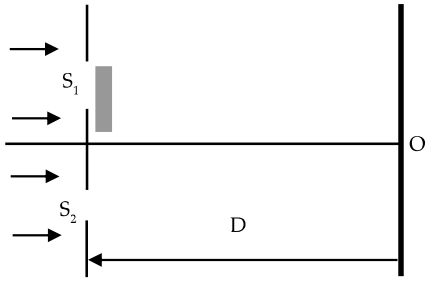
(3) $\sqrt{1+\tan^2\left(\frac{A}{2}\right)}$ **(4)** $\sqrt{1+\cot^2\left(\frac{A}{2}\right)}$

Q. 18. A convex lens of focal length 15 cm is placed coaxially in front of a convex mirror. The lens is 5 cm from the pole of the mirror. When an object is placed on the axis at a distance of 20 cm from the lens, it is found that the image coincides with the object. Calculate the radius of curvature of the mirror - (consider all optical event) :

(1) 45 cm **(2)** 55 cm

(3) 65 cm **(4)** 85 cm

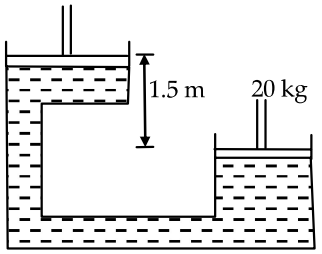
Q. 19. In the diagram shown, the separation between the slit is equal to 3λ, where λ is the wavelength of the light incident on the plane of the slits. A thin film of thickness 3λ and refractive index 2 has been placed in the front of the upper slit. The distance of the central maxima on the screen from O is:



(1) D **(2)** $\frac{\lambda d}{D}$

(3) $\frac{\lambda D}{d}$ **(4)** None of these

Q. 20. In a hydraulic press there is a larger piston of diameter 35 cm at a height of 1.5 m relative to the smaller piston of diameter 10 cm. A 20 kg mass is loaded on the smaller piston. Density of oil in the press is 750 kg/m^3. The thrust on the load by the larger piston is :



(1) 1.1×10^3 N **(2)** 1.3×10^3 N

(3) 1.1×10^4 N **(4)** 1.3×10^4 N

Section B

Q. 21. A wet open umbrella is held upright and is rotated about the handle at a uniform rate of 21 revolutions in 44 s. If the rim of the umbrella is circle of 1 metre in diameter and the height of the rim above the floor is 1.5 m, the drops of water spun off the rim and hit the floor at a horizontal ..... m from umbrella.

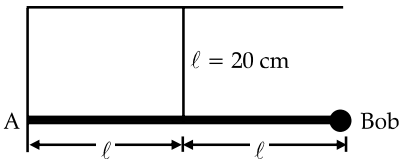
Q. 22. A block of mass 2.0 kg is pulled up on a smooth incline of angle 30° with the horizontal. If the block moves with an acceleration of 1.0 m/s^2, the power delivered by the pulling force at a time 4.0 s after the motion starts is ..... J/s.

Q. 23. A ball of mass m = 20 kg released from height h = 10 m falls on the Earth's surface. The speed of the Earth when the ball reaches on the Earth's surface is ..... × 10^{-23} m/s.

Q. 24. A Car takes a circular turn of radius 20 m at a speed of 54 km/h. The least coefficient of friction between tyres and road that can prevent slide slipping is .....

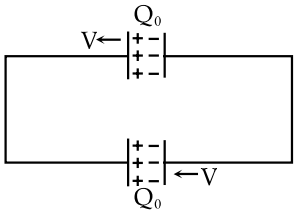
Q. 25. An artificial satellite is moving in a circular orbit around the earth with a speed equal to half the magnitude of escape velocity from the earth. If the satellite is stopped in its orbit and allowed to fall freely onto the earth, the speed with which it hits the surface ..... km/s. [g = 9.8 ms^{-2} and R_e = 6400 km]

Q. 26. A weightless rigid rod with a small iron bob at the end is hinged at point A to the wall so that it can rotate in all directions. The rod is kept in the horizontal position by a vertical inextensible string of length 20 cm, fixed at its mid point. The bob is displaced slightly, perpendicular to the plane of the rod and string. The period of small oscillations of the system in the form $\frac{\pi x}{10}$ is ..... s. and value of x is ..... (g = 10 m/s^2)



Q. 27. A non-conducting sphere of radius R = 5 cm has its centre at origin O of co-ordinate system. It has a spherical cavity of radius r = 1 cm having its centre at (0, 3 cm). Solid material of sphere has uniform positive charge density $\rho = \frac{10^{-6}}{\pi}$ coulomb m^{-3}. The potential at point P is .....volt. (4 cm, 0).

Q. 28. Two identical capacitors are connected as shown and having initial charge Q_0. Separation between plates of each capacitor is d_0. Suddenly the left plate of upper capacitor and right plate of lower capacitor start moving with speed v towards left while other plate of each capacitor remains fixed. (given $\frac{Q_0 V}{2d_0}$ = 10 A). The value of current in the circuit is……. A.



Q. 29. A 15 A circuit breaker trips in home when the current through it, reaches 15 A. The minimum number of 100 watt light bulb operated at 120 volts in home is .....

Q. 30. A charged particle is accelerated through a potential difference of 12 kV and acquires a speed of 10^6 m s^{-1}. It is projected perpendicularly into the magnetic field of strength 0.2 T. The radius of circle described is…… cm.

Chemistry

Section A

Q. 31. The correct IUPAC name of $CH_3CH(CH_2-CH_3)-C\equiv C-CH_3$ is:

(1) 3-methyl hexyne-4
(2) 4-ethyl pentyne-2
(3) 4-methyl hex-2-yne
(4) None of the above

Q. 32. How many conformations does ethane have?

(1) 1 **(2)** 2
(3) 3 **(4)** Infinite

Q. 33. Bonding in which of the following diatomic molecule(s) become(s) stronger, on the basis of MO Theory, by removal of an electron?

(1) N_2 **(2)** O_2 **(3)** C_2 **(4)** B_2

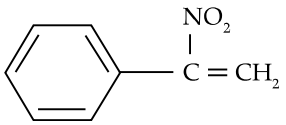
Q. 34. The correct order of electron gain enthalpies of Cl, F, Te and Po is:

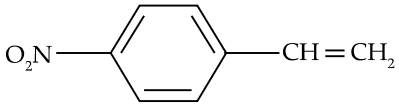
(1) F < Cl <Te < Po **(2)** Po <Te< F < Cl

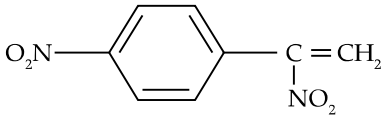
(3) Te < Po < Cl < F **(4)** Cl < F < Te< Po

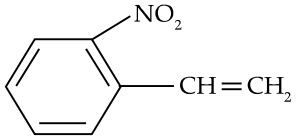
Q. 35. In the given reaction sequence, the major product 'C' is:

$C_8H_{10} \xrightarrow[H_2SO_4]{HNO_3} A \xrightarrow[\Delta]{Br_2} B \xrightarrow[KOH]{\text{alcoholic}} C$

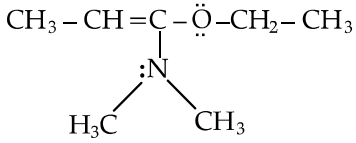
(1) 

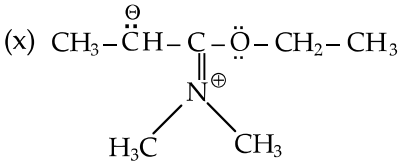
(2) 

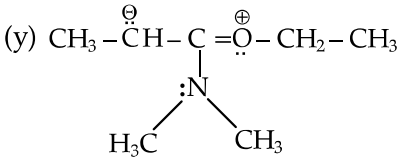
(3) 

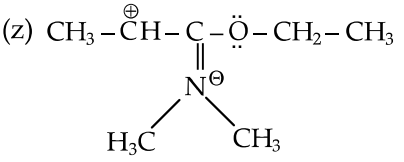
(4) 

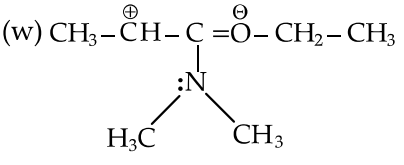
Q. 36. The acceptable resonating structures of the following molecule are :



(x) 

(y) 

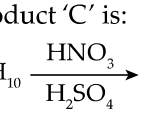
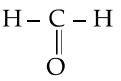
(z) 

(w) 

(1) x, y **(2)** x, z

(3) y, z **(4)** z, w

Q. 37. What would be the product when ethene is oxidised with cold dil. $KMnO_4$ solution? (Hydrocarbon)

(1)  **(2)** 

(3) **(4)** $CO_2 + H_2O$

Q. 38.

Functional groups Y, –CH = CH_2 and X respectively are ... and ... directing.

(1) Meta, ortho–para and ortho–para

(2) Meta, meta and meta

(3) Meta, ortho–para and meta

(4) All the three ortho–para

Q. 39. The observed dipole-moment of HCl molecule is 1.03D. If H—Cl bond distance is 1.275 Å and electronic charge is 4.8×10^{-10} esu. What is the percent polarity of HCl ?

(1) 1.275 Å × 1.03

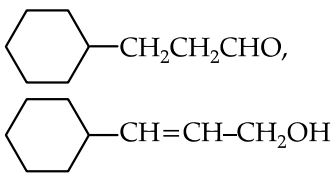
(2) $\dfrac{4.8\times10^{-10}\times1.275\times10^{-8}}{1.03}$

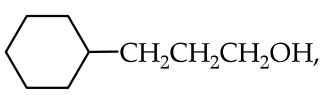
(3) $\dfrac{1.03\times100\times10^{-18}}{4.8\times10^{-10}\times1.275\times10^{-8}}$

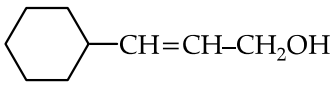
(4) $\dfrac{4.8\times10^{-10}}{1.03}\times 10$

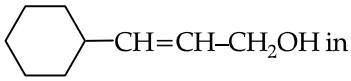
Q. 40.

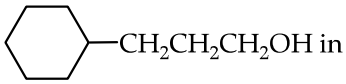
A and B are -

(1) 

(2) 



(3)  $CH=CH-CH_2OH$ in both cases

(4)  $CH_2CH_2CH_2OH$ in both cases

Q. 41. $C_3H_8O \xrightarrow[K_2Cr_2O_7/H_2SO_4]{[O]} C_3H_6O \xrightarrow{I_2+NaOH(aq.)} CHI_3,$

In this reaction the first compound is :

(1) $CH_3CH_2CH_2OH$

(2) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$

(3) $CH_3OCH_2CH_3$

(4) CH_3CH_2CHO

Q. 42. Benzoic acid gives benzene on being heated with X and phenol gives benzene on being heated with Y. Therefore X and Y are respectively:

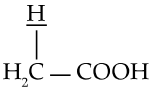
(1) Soda lime and copper

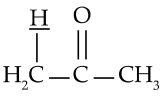
(2) Zinc dust and sodium hydroxide

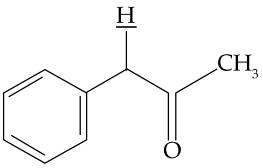
(3) Zinc dust and soda lime

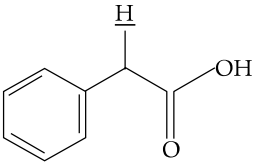
(4) Soda lime and zinc dust

Q. 43. Among the following marked proton of which compound shows lowest pK_a value?

(1) 

(2) 

(3) 

(4) 

Q. 44. Two elements X (atomic weight = 75) and Y (atomic weight = 16) combine to give a compound having 75.8% X. The formula of the compound is :

(1) XY **(2)** X_2Y

(3) X_2Y_2 **(4)** X_2Y_3

Q. 45. In the reaction–(Biomolecules)

$nCH_2-CH=CH_2 \xrightarrow{[X]} \left(-CH(CH_3)-CH_2-\right)_n$

Reagent X is :

(1) Triethyl aluminium and titanium tetrachloride

(2) Triethyl aluminium

(3) Zeigler Natta Catalyst

(4) Both 1 and 3

Q. 46. On heating $Cu(NO_3)_2$ strongly, the material finally obtained is :

(1) Cu **(2)** Cu_2O

(3) $Cu(NO_2)_2$ **(4)** $Cu(NO_3)_2$

Q. 47. The value of Δ_0 for $RhCl_6^{3-}$ is 234 kJ/mol what wavelength of light will promote an electron from t_{2g} set to e_g set.

(1) 100 nm **(2)** 612 nm

(3) 280 nm **(4)** 511 nm

Q. 48. Arrange the following in increasing order of reactivity towards nitration

A. p–xylene **B.** bromobenzene

C. mesitylene **D.** nitrobenzene

E. benzene

Choose the correct answer from the options given below

(1) C<D<E<A<B **(2)** D<B<E<A<C

(3) D<C<E<A<B **(4)** C<D<E<B<A

Q. 49. A white powder when strongly heated gives off brown fumes. A solution of this powder gives a yellow precipitate with a solution of KI. When a solution of barium chloride is added to a solution of powder, a white precipitate results. This white powder may be :

(1) A soluble sulphate

(2) KBr or NaBr

(3) $Ba(NO_3)_2$

(4) $AgNO_3$

Q. 50. In neutral or faintly alkaline medium, $KMnO_4$ being a powerful oxidant can oxidize thiosulphate almost quantitatively to sulphate. In this reaction overall change in oxidation state of manganese will be :

(1) 5 **(2)** 1 **(3)** 0 **(4)** 3

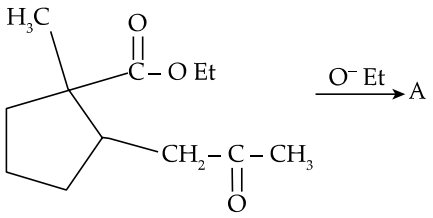
Section B

Q. 51. A definite volume of H_2O_2 undergoing spontaneous decomposition required 22.8 c.c. of standard permanganate solution for titration. After 10 and 20 minutes respectively the volumes of permanganate required were 13.8 and 8.25 c.c. The time required for the decomposition to be half completed is ..... min.

Q. 52. The half-life of cobalt 60 is 5.26 years. The percentage activity remaining after 4 years is .....%.

Q. 53. The e.m.f. of cell Zn | $ZnSO_4$ || $CuSO_4$| Cu at 25°C is 0.03 V and the temperature coefficient of e.m.f. is -1.4×10^{-4} V per degree. The heat of reaction for the change taking place inside the cell is – (.....) kJ/mol.

Q. 54. In the given reaction



(Where Et is $-C_2H_5$)

The number of chiral carbon/s in product A is _____.

Q. 55. At 345 K, the half life for the decomposition of a sample of a gaseous compound initially at 55.5 kPa was 340s. When the pressure was 27.8 kPa, the half life was found to be 170 s. The order of the reaction is _____. [Integer answer]

Q. 56. A solution of a non volatile solute in water freezes at –0.30°C. The vapour pressure of pure water at 298 K is 23.51 mm Hg and K_f for water is 1.86° C/mol. The vapour pressure of rain solution at 298 K is ..... mm Hg.

Q. 57. Manganese (VI) has ability to disproportionate in acidic solution. The difference in oxidation states of two ions which forms in acidic solution is _____.

Q. 58. The molar heats of formation of NH_4NO_3 (s) is – 367.54 kJ and those of N_2O (g), H_2O (l) are 81.46 and – 285.8 kJ respectively at 25°C and atmosphere pressure. The difference of ΔH and ΔE of the reaction

NH_4NO_3 (s) $\rightarrow N_2O$ (g) + $2H_2O$(l) is ..... kJ.

Q. 59. A 0.5 g sample of an iron-containing mineral mainly in the form of $CuFeS_2$ was reduced suitably to convert all the ferric iron into ferrous form and was obtained as a solution. In the absence of any interfering matter, the solution required 42 ml of 0.01 M $K_2Cr_2O_7$ solution for titration. The percentage of $CuFeS_2$ in the mineral is .....% (Cu = 63.5, Fe = 55.8, S = 32, O = 16).

Q. 60. Sulphide ion in alkaline solution reacts with solid sulphur to form polysulphide ions having formula, S_2^{2-}, S_3^{2-}, S_4^{2-}, etc. if K_1 = 12 for $S+S^{2-} \rightleftharpoons S_2^{2-}$ and K_2 = 132 for $2S+S^{2-} \rightleftharpoons S_3^{2-}$, K_3 = ... for $S+S_2^{2-} \rightleftharpoons S_3^{2-}$.

Mathematics

Section A

Q. 61. $\int\left(\log(\log x)+\frac{1}{(\log x)^2}\right)dx =$

(1) $x\log\log x+\frac{x}{\log x}+c$

(2) $x\log\log x+\frac{2x}{\log x}+c$

(3) $x\log\log x-\frac{x}{\log x}+c$

(4) $x\log\log x-\frac{2x}{\log x}+c$

Q. 62. $\lim\limits_{n\to\infty}\left\{\left(1+\frac{1}{n^2}\right)^{\frac{2}{n^2}}\left(1+\frac{2^2}{n^2}\right)^{\frac{4}{n^2}}\left(1+\frac{3^2}{n^2}\right)^{\frac{6}{n^2}}\ldots\left(1+\frac{n^2}{n^2}\right)^{\frac{2n}{n^2}}\right\}$ is equal to :

(1) $\frac{e}{4}$ **(2)** $\frac{4}{e}$ **(3)** 1 **(4)** $\frac{e}{2}$

Q. 63. The probability, that in a randomly selected 3-digit number at least two digits are odd, is

(1) $\frac{19}{36}$ **(2)** $\frac{15}{36}$ **(3)** $\frac{13}{36}$ **(4)** $\frac{23}{36}$

Q. 64. Let $f(x)$ be a function such that ;
$f'(x) = \log_{1/3}(\log_3(\sin x + a))$ (where $a \in R$). If $f(x)$ is decreasing for all real values of x, then the exhaustive solution set of a is ..... .

(1) (1, 4) **(2)** (4, ∞)
(3) (2, 3) **(4)** (2, ∞)

Q. 65. If $y = y(x)$ is the solution of the differential equation $2x^2\frac{dy}{dx} - 2xy + 3y^2 = 0$ such that $y(e) = \frac{e}{3}$, then $y(1)$ is equal to

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

(3) $\frac{3}{2}$ (4) 3

Q. 66. The length of the perpendicular from the point (2, –1, 4) on the straight line, $\frac{x+3}{10}=\frac{y-2}{-7}=\frac{z}{1}$ is :

(1) greater than 3 but less than 4
(2) less than 2
(3) greater than 2 but less than 3
(4) greater than 4

Q. 67. The vector $\vec{p}$ perpendicular to the vectors $\vec{a}=2\hat{i}+3\hat{j}-\hat{k}$ and $\vec{b}=\hat{i}-2\hat{j}+3\hat{k}$ and satisfying the condition $\vec{p}\cdot\left(2\hat{i}-\hat{j}+\hat{k}\right)=-6$ is :

(1) $-\hat{i}+\hat{j}+\hat{k}$ **(2)** $3\left(-\hat{i}+\hat{j}+\hat{k}\right)$

(3) $2\left(-\hat{i}+\hat{j}+\hat{k}\right)$ **(4)** $\hat{i}-\hat{j}+\hat{k}$

Q. 68. If $a^2 + b^2 + c^2 = -2$ and

$$f(x)=\begin{vmatrix} 1+a^2x & \left(1+b^2\right)x & \left(1+c^2\right)x \\ \left(1+a^2\right)x & 1+b^2x & \left(1+c^2\right)x \\ \left(1+a^2\right)x & \left(1+b^2\right)x & 1+c^2x \end{vmatrix}$$

then $f(x)$ is a polynomial of degree

(1) 1 **(2)** 0
(3) 3 **(4)** 2

Q. 69. If $ax^4 + bx^3 + cx^2 + dx + e =$

$$\begin{vmatrix} 2x & x-1 & x+1 \\ x+1 & x^2-x & x-1 \\ x-1 & x+1 & 3x \end{vmatrix}$$

, then the value of e, is :

(1) 0 **(2)** –2
(3) 3 **(4)** –1

Q. 70. Number of integral values of x satisfying the inequality $\left(\frac{3}{4}\right)^{6x+10-x^2} < \frac{27}{64}$ is :

(1) 6 **(2)** 7
(3) 8 **(4)** Infinite

Q. 71. If α and β are the roots of the equation $x^2 + px + 2 = 0$ and $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ are the roots of the equation $2x^2 + 2qx + 1 = 0$, then $\left(\alpha-\frac{1}{\alpha}\right)\left(\beta-\frac{1}{\beta}\right)\left(\alpha+\frac{1}{\beta}\right)\left(\beta+\frac{1}{\alpha}\right)$ is equal to :

(1) $\frac{9}{4}\left(9+q^2\right)$ **(2)** $\frac{9}{4}\left(9-q^2\right)$

(3) $\frac{9}{4}\left(9+p^2\right)$ **(4)** $\frac{9}{4}\left(9-p^2\right)$

Q. 72. The sum of the series
$1.3^2 + 2.5^2 + 3.7^2$+.... upto 20 terms is :

(1) 188090 **(2)** 180890
(3) 189820 **(4)** 180889

Q. 73. If ${}^mC_3 + {}^mC_4 > {}^{m+1}C_3$, then least value of m is:

(1) 6 **(2)** 7 **(3)** 5 **(4)** 4

Q. 74. Ten different letters of an alphabet are given. Words with five letters are formed from these given letters. Determine the number of words which have at least one letter repeated.

(1) 69762 **(2)** 69676
(3) 69760 **(4)** 69766

Q. 75. If m_1 and m_2 are roots of the equation $x^2+\left(\sqrt{3}+2\right)x+\left(\sqrt{3}-1\right)=0$, then the area of the triangle formed by the lines $y = m_1x$, $y = m_2x$ and $y = c$ is :

(1) $\left(\frac{\sqrt{33}-\sqrt{11}}{4}\right)c^2$ **(2)** $\left(\frac{\sqrt{33}+\sqrt{11}}{4}\right)c^2$

(3) $\left(\frac{\sqrt{33}+\sqrt{11}}{2}\right)c^2$ **(4)** $\left(\frac{\sqrt{33}-\sqrt{11}}{2}\right)c^2$

Q. 76. If the length of the chord of the circle, $x^2 + y^2 = r^2$ $(r > 0)$ along the line, $y - 2x = 3$ is r, then r^2 is equal to :

(1) $\frac{9}{5}$ **(2)** 12

(3) $\frac{24}{5}$ **(4)** $\frac{12}{5}$

Q. 77. The centre of the circle passing through the point (0, 1) and touching the parabola $y = x^2$ at the point (2, 4) is :

(1) $\left(\frac{-53}{10},\frac{16}{5}\right)$ **(2)** $\left(\frac{6}{5},\frac{53}{10}\right)$

(3) $\left(\frac{3}{10},\frac{16}{5}\right)$ **(4)** $\left(\frac{-16}{5},\frac{53}{10}\right)$

Q. 78. The eccentricity, foci and the length of the latus rectum of the ellipse $x^2 + 4y^2 + 8y - 2x + 1 = 0$ are respectively equal to :

(1) $\frac{\sqrt{3}}{2}$; $\left(1\pm\sqrt{3},\ -1\right)$; 2

(2) $\frac{\sqrt{3}}{2}$; $\left(1\pm\sqrt{3},\ 1\right)$; 1

(3) $\frac{\sqrt{3}}{2}$; $\left(1\pm\sqrt{3},\ -1\right)$; 1

(4) $\frac{\sqrt{3}}{2}$; $\left(1\pm\sqrt{3},\ 1\right)$; 2

Q. 79. $(x-1)^2+(y-2)^2=\frac{3\left(2x+3y+2\right)^2}{13}$ represents hyperbola whose eccentricity is :

(1) $\frac{\sqrt{13}}{\sqrt{3}}$ **(2)** $\frac{\sqrt{13}}{3}$

(3) $\sqrt{3}$ **(4)** 3

Q. 80. If the point (1, 3) serves as the point of inflection of the curve $y = ax^3 + bx^2$, then the value of 'a' and 'b' are

(1) $a=\frac{3}{2}$ and $b=-\frac{3}{2}$

(2) $a=\frac{3}{2}$ and $b=\frac{9}{2}$

(3) $a=-\frac{3}{2}$ and $b=-\frac{9}{2}$

(4) $a=-\frac{3}{2}$ and $b=\frac{9}{2}$

Section B

Q. 81. If $f(x)=3\cos\left(x+\frac{5\pi}{6}\right)-5\sin x+2$, then maximum value of $f(x)$ is .....

Q. 82. Let $x=\frac{\sin^3\theta}{\cos^2\theta}$, $y=\frac{\cos^3\theta}{\sin^2\theta}$ and $\sin\theta+\cos\theta=\frac{1}{2}$. If $x + y = \frac{p}{q}$ where p and q are coprime, then $(p + q)$ is equal to : .....

Q. 83. Consider $f(x) = \sin^{-1}[2x] + \cos^{-1}([x] - 1)$ (where [.] denotes greatest integer function.) If domain of $f(x)$ is $[a, b)$ and the range of $f(x)$ is $\{c, d\}$, then $a + b + \frac{2d}{c}$ is equal to ..... (where $c < d$)

Q. 84. If $\tan x = \frac{m-\sqrt{n}}{3}$ for $x\in(0, \pi)$ and $\sin x + \cos x = \frac{1}{2}$, then $(m + n)$ is equal to.....

Q. 85. Let a real valued function $f(x)$ satisfying $f(x + y) + f(x - y) = f(x)f(y)$ $\{f(0) \neq 0\}$ $\forall\ x, y \in \mathrm{R}$, then $f(-2) - f(-1) + f(0) + f(1) - f(2)$ is equal to .....

Q. 86. The value of $\lim\limits_{x\to 0}\dfrac{(\sin(\ell ne^x))^2}{(e^{\tan^2 x}-1)}$ is .....

Q. 87. The positive value of the determinant of the matrix A, whose $Adj(Adj(A))$ = $\begin{pmatrix} 14 & 28 & -14 \\ -14 & 14 & 28 \\ 28 & -14 & 14 \end{pmatrix}$, is ....

Q. 88 If $y = x^{(\sin x)^{x(\sin x)^{x^{\cdot^{\cdot^{\cdot\infty}}}}}}$, then $\dfrac{dy}{dx}$ at $x = \dfrac{\pi}{2}$ is equal to ..... .

Q. 89. If $y = f(x)$, $f'(0) = f(0) = 1$ and if $y = f(x)$ satisfies $\dfrac{d^2y}{dx^2}+\dfrac{dy}{dx} = x$, then the value of $[f(1)]$ is ..... (where [.] denotes greatest integer function)

Q. 90. A man has 3 pairs of white socks and 2 pairs of blue socks kept together in a bag. If he dressed up hurriedly in the dark, the probability that after he has put on a white sock, he will then put on another white sock is $\dfrac{\mathrm{M}}{n}$ ($\dfrac{\mathrm{M}}{n}$ is in simplest form), then $n - \mathrm{M}$ = ...