Discover the Star within you and Get Rewarded

Paper Code: 02

CAREER POINT

STAR

Scholastic **T**est for **A**nalysis and **R**eward

CLASS - 12th (PCM)

(Class 12th Studying Students)

Duration: 2:00 hours **Maximum marks: 300**

Instructions to Candidates

1. CP Star Test paper consists of total 75 questions and has been divided in three sections as follows:

a.	Physics	25 Questions	Que. No. 01 to 25
b	Chemistry	25 Questions	Que. No. 26 to 50
c.	Mathematics	25 Questions	Que. No. 51 to 75

2. All questions are compulsory.
3. All the answers will be encircled in OMR sheet which is being provided along with this paper.
4. For every correct answer marked by you, **4** marks will be allotted.
5. For every incorrect answer marked by you, **1** marks will be deducted.
5. Use of calculator is not permitted in any case.
7. Any kind of malpractice will expel you from exam immediately.
8. For any confusion please talk to the invigilator in the examination hall.
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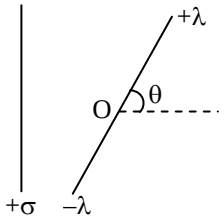
SECTION-a [PHYSICS]

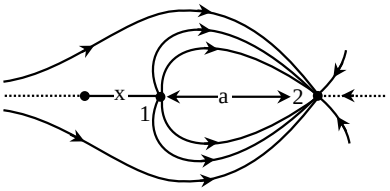
Q.1 A large sheet carries uniform surface charge density σ. A rod of length 2ℓ has a linear charge density λ on one half and $-\lambda$ on the other half. The rod is hinged at mid-point O and makes angle θ with the normal to the sheet. The torque experienced by the rod is (consider electric field due to sheet of charge as $\frac{\sigma}{2\varepsilon_0}$ perpendicular to the sheet)



(1) $\frac{\sigma\lambda\ell^2}{2\varepsilon_0}\cos\theta$ (2) $\frac{\sigma\lambda\ell}{\varepsilon_0}\cos^2\theta$

(3) $\frac{\sigma\lambda\ell^2}{2\varepsilon_0}\sin\theta$ (4) $\frac{\sigma\lambda\ell}{\varepsilon_0}\sin^2\theta$

Q.2 The field pattern is shown due to two point charges 1 and 2. Then $\frac{q_1}{q_2} =$

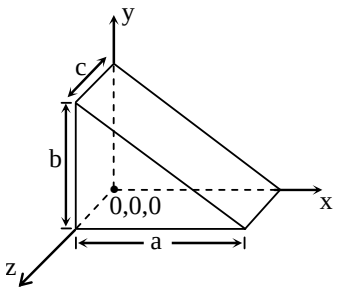


(1) $-\frac{1}{2}$ (2) -2

(3) $\frac{1}{2}$ (4) None of these

Q.3 In the given electric field

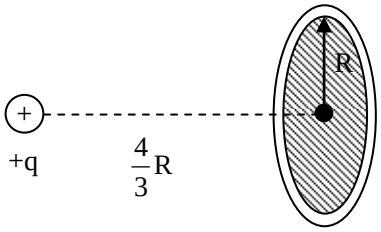
$E = [(d + x)\,\hat{i} + E_0\,\hat{j}]$ N/C a hypothetical closed surface is taken as shown in figure. The total charged enclosed within the close surface is -



(1) $\frac{abc\in_0}{2}$ (2) $\frac{acd\in_0}{2}$

(3) $\frac{abd\in_0}{2}$ (4) None of these

Q.4 Find the flux through the disc.



(1) $\frac{q}{10\varepsilon_0}$ (2) $\frac{q}{5\varepsilon_0}$

(3) $\frac{q}{6\varepsilon_0}$ (4) $\frac{q}{2\varepsilon_0}$

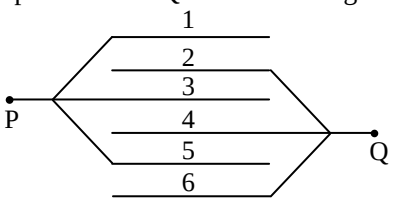
Space for rough work

Q.5 Two parallel plate air filled capacitors each of capacitance C, are joined in series to a battery of emf V. The space between the plates of one of the capacitors is then completely filled up with a uniform dielectric having dielectric constant K. The quantity of charge which flows through the battery is -

(1) $\frac{CV}{2}\left(\frac{K-1}{K+1}\right)$ (2) $\frac{CV}{2}\left(\frac{K+1}{K-1}\right)$

(3) $CV\left(\frac{K-1}{K+1}\right)$ (4) $CV\left(\frac{K+1}{K-1}\right)$

Q.6 Six metallic plates each with a surface area of one side A, are placed at a distance d from each other. The alternate plates are connected to points P and Q as shown in figure :

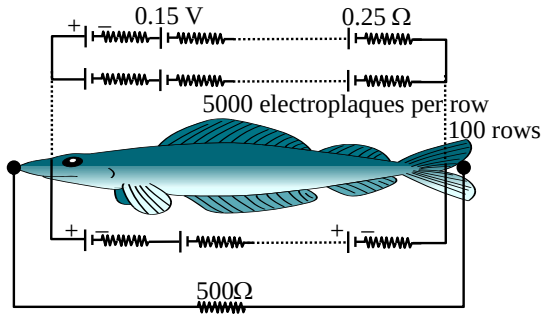


The capacitance of the system is :

(1) $\varepsilon_0 A/d$ (2) $5\varepsilon_0 A/d$

(3) $6\varepsilon_0 A/d$ (4) $\varepsilon_0 A/5d$

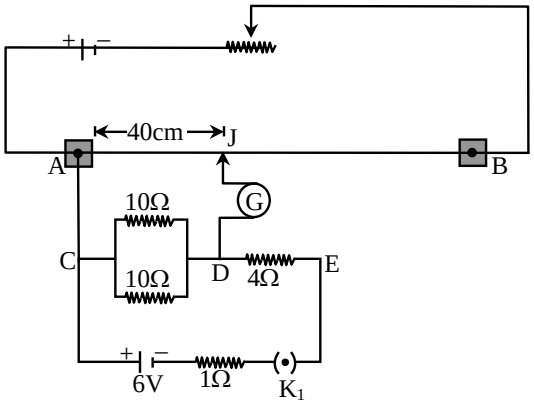
Q.7 Eels are able to generate current with biological cells called electroplaques. The electroplaques in an eel are arranged in 100 rows, each rwo stretching horizontally along the body of the fish containing 5000 electroplaques. The arrangement is suggestively shown below. Each electroplaque has an emf of 0.15 V and internal resistance of 0.25Ω. The water surrounding the eel completes a circuit between the head and its tail. If the water surrounding it has a resistance of 500 Ω, the current an eel can produce in water is about



(1) 1.5 A (2) 3.0 A

(3) 15 A (4) 30 A

Q.8 In the circuit shown in figure the potential difference between the points C and D is balanced against 40 cm length of potentiometer wire of total length 100 cm. In order to balance the potential difference between the points D and E, where should jockey be pressed on potentiometer wire i.e. balance length is-

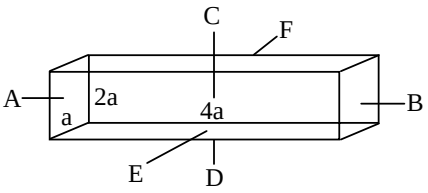


(1) 16 cm (2) 32 cm

(3) 56 cm (4) 80 cm

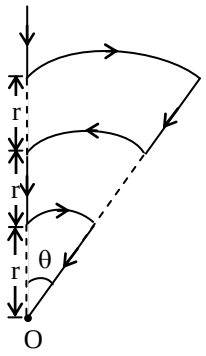
Space for rough work

Q.9 A conductor with rectangular cross-section has dimensions (a × 2 a × 4 a) as shown in figure. Resistance across AB is R_1, across CD is R_2 and across EF is R_3. Then



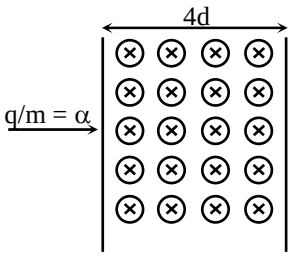
(1) $R_1 = R_2 = R_3$ (2) $R_1 > R_2 > R_3$
(3) $R_2 > R_3 > R_1$ (4) None

Q.10 Shown in the figure is a conductor carrying a current I. The magnetic field intensity at the point O(common centre of all the three arcs) is :



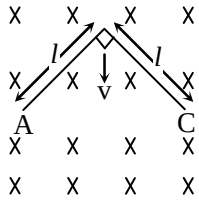
(1) $\frac{5\mu_0 I\theta}{24\pi r}$ (2) $\frac{\mu_0 I\theta}{24\pi r}$
(3) $\frac{11\mu_0 I\theta}{24\pi r}$ (4) zero

Q.11 If a charged particle of charge to mass ratio $\frac{q}{m} = \alpha$ enters in a magnetic field of strength B at a speed v = (2αd)(B), then -



(1) angle subtended by the path of charged particle in magnetic field at the center of circular path is 2π
(2) the charge will move on a circular path and then will come out from magnetic field at some distance from the point of insertion
(3) the time for which particle will be in the magnetic field is $\frac{2\pi}{\alpha B}$
(4) angle subtended by the path of charged particle in magnetic field at the center of circular path is $\pi/2$

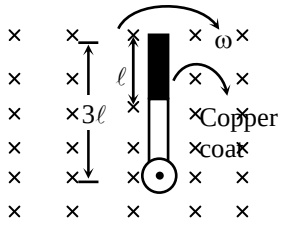
Q.12 A rigid conducing wire bent as shaped in the figure, is released to fall freely in a horizontal magnetic field which is perpendicular to the plane of the conductor. If the magnetic field strength is B, then the emf induced across the points A and C when it has fallen through a distance h will be -



(1) $Bl\sqrt{2gh}$ (2) $Bl\sqrt{gh}$
(3) $2Bl\sqrt{gh}$ (4) $2Bl\sqrt{2gh}$

Space for rough work

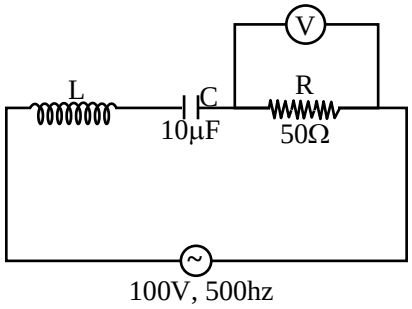
Q.13 A wooden stick of length 3ℓ is rotated about an end with constant angular velocity ω in a uniform magnetic field B perpendicular to the plane of motion. If the upper one-third of its length is coated with copper, the potential difference across the whole length of the stick is



(1) $\frac{9B\omega\ell^2}{2}$ (2) $\frac{4B\omega\ell^2}{2}$

(3) $\frac{5B\omega\ell^2}{2}$ (4) $\frac{B\omega\ell^2}{2}$

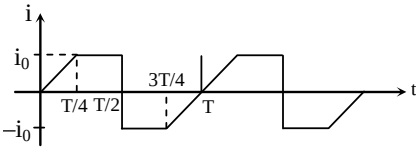
Q.14 In the circuit shown, voltmeter reads 100V. Then L is



(1) 0.1 H (2) 0.2 H

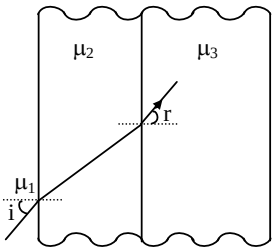
(3) 0.02 H (4) 0.01 H

Q.15 Mean value of the given alternating current (A.C.) for half cycle (0 to T/2), is -



(1) $\frac{i_0}{2}$ (2) $\frac{i_0}{4}$ (3) $\frac{3i_0}{4}$ (4) Zero

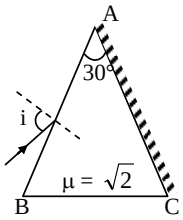
Q.16 In the figure shown $\frac{\sin i}{\sin r}$ is equal to :



(1) $\frac{\mu_2^2}{\mu_3\mu_1}$ (2) $\frac{\mu_3}{\mu_1}$

(3) $\frac{\mu_3\mu_1}{\mu_2^2}$ (4) None of the above

Q.17 Calculate value of i for which light ray will retrace its original path-



(1) 90° (2) 60° (3) 45° (4) 30°

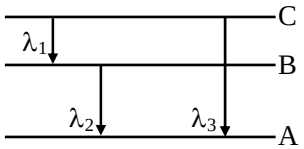
Space for rough work

Q.18 A ray of light is incident on a plane mirror along a vector $\hat{i} + \hat{j} - \hat{k}$. The normal on incidence point is along $\hat{i} + \hat{j}$. Then unit vector along the reflected ray is -

(1) $\frac{1}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$ (2) $-\frac{1}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$

(3) $\frac{1}{\sqrt{3}}(-\hat{i} - \hat{j} + \hat{k})$ (4) None of these

Q.19 Energy levels A, B, C of a certain atom corresponds to increasing values of energy, i.e., $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are the wavelengths of radiations corresponding to the transitions, C to B, B to A and C to A respectively, which of the following statement is correct ?



(1) $\lambda_3 = \lambda_1 + \lambda_2$ (2) $\lambda_3 = \frac{\lambda_2\lambda_1}{\lambda_1 + \lambda_2}$

(3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ (4) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

Q.20 The radius of the nth Bohr orbit of hydrogen like atom of atomic number Z is given by :

(where $k = \frac{1}{4\pi\varepsilon_0}$)

(1) $\frac{n^2h^2}{4\pi^2kZme^2}$ (2) $\frac{k\pi h}{4\pi^2Zme^2}$

(3) $\frac{n^2h^2}{2\pi^2kZme^2}$ (4) $\frac{nh}{2\pi^2kZme^2}$

Q.21 A sample of radioactive material decays simultaneously by two processes A and B with half-lives $\frac{1}{2}$ hr and $\frac{1}{4}$ hr, respectively. For first half hour it decays with the process A, next one hour with the process B, and for further half an hour with both A and B. If originally there were N_0 nuclei, find the number of nuclei after 2h of such decay.

(1) $\frac{N_0}{(2)^8}$ (2) $\frac{N_0}{(2)^4}$ (3) $\frac{N_0}{(2)^6}$ (4) $\frac{N_0}{(2)^5}$

Q.22 During mean life of a radioactive element, the fraction that disintegrates is -

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

Q.23 Photon and electron are given same energy (10^{-20} J). Wavelength associated with photon and electron are λ_{Ph} and λ_{el}, then correct statement will be -

(1) $\lambda_{Ph} > \lambda_{el}$ (2) $\lambda_{Ph} < \lambda_{el}$

(3) $\lambda_{Ph} = \lambda_{el}$ (4) $\frac{\lambda_{el}}{\lambda_{Ph}} = C$

Q.24 If potential of 20 kV is applied across coolidge tube then wavelength that can not emitted from coolidge tube is

(1) 0.5 Å (2) 0.8 Å

(3) 1 Å (4) 100 Å

Space for rough work

Q.25 Light described at a place by the equation

$E = (100\ V/m)\ [\sin (5 \times 10^{15}\ s^{-1})\ t + \sin (8 \times 10^{15}\ s^{-1})\ t]$

falls on a metal surface having work function 2eV.

Calculate the max. K.E. of the photo electron.

(1) 5.27 eV (2) 1.71 eV

(3) 3.27 eV (4) 0.854 eV

SECTION-b [CHEMISTRY]

Q.26 Which of the following statements is incorrect ?

(1) When NaCl reacts with acidified dichromate, it forms CrO_2Cl_2 which forms yellow precipitate with NaOH

(2) $K_2Cr_2O_7$ form deep blue solution of CrO_5 with H_2O_2 in acidic medium

(3) $KMnO_4$ is prepared form pyrolusite ore (MnO_2)

(4) Both $KMnO_4$ and $K_2Cr_2O_7$ are coloured due to charge transfer spectra

Q.27 The rate law of the reaction,

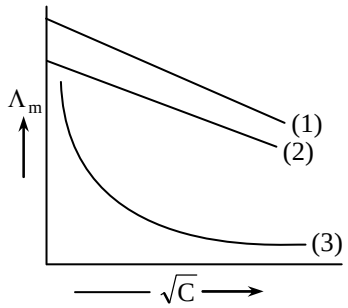
$$A + 2B \longrightarrow \text{Product},$$

Product is given by $\frac{d[P]}{dt} = K[A]^2.[B]$. If A is taken in large excess, the order of the reaction will be :

(1) zero (2) 1

(3) 2 (4) 3

Q.28 Molar conductance Λ_m is plotted against $\sqrt{C}$ (mol litre^{-1}) for three electrolytes (NaCl, HCl, NH_4OH)



which of the following is correct

1	2	3
(1) NaCl	HCl	NH_4OH
(2) HCl	NaCl	NH_4OH
(3) NH_4OH	NaCl	HCl
(4) NH_4OH	HCl	NaCl

Q.29 A body centered cubic lattice is made up of hollow spheres of B. Spheres of solid A are present in hollow spheres of B. Radius A is half of radius of B. What is the ratio of total volume of spheres of B unoccupied by A in a unit cell and volume of unit cell ?

(1) $\frac{7\sqrt{3\pi}}{64}$ (2) $\frac{7\sqrt{3}}{128}$ (3) $\frac{7.\pi}{24}$ (4) $\frac{7\pi}{64\sqrt{3}}$

Q.30 Assuming complete ionization, the solution having maximum freezing point will be -

(1) 1 M CaF_2 (2) 1.5 M $Al_2(SO_4)_3$

(3) 2 M NaCl (4) 1 M $AgNO_3$

Space for rough work

Q.31 Consider the following complexes -

(i) K_2PtCl_6 (ii) $PtCl_4.2NH_3$

(iii) $PtCl_4.3NH_3$ (iv) $PtCl_4.5NH_3$

Their electrical conductances in aq. solutions are-

(1) 256, 0, 97, 404 (2) 404, 0, 97, 256

(3) 256, 97, 0, 404 (4) 404, 97, 256, 0

Q.32 On heating a mixture of Cu_2O and Cu_2S, we get :

(1) $Cu + SO_2$ (2) $Cu + SO_3$

(3) $CuO + CuS$ (4) Cu_2SO_3

Q.33 For a gas reaction at T(K) the rate is given by $-\frac{dp_A}{dt} = k' p_A^2$ atm/hr. If the rate equation is expressed as : $-r_A = -\frac{1}{V}\frac{dn_A}{dt} = kC_A^2$, mol/(litre–hr), the rate constant k is given by–

(1) k = k' (2) k = k' RT

(3) k = k'/RT (4) $k = k' (RT)^2$

where R = ideal gas law constant, cal/g mol. K

Q.34 Effective atomic number of $Co(CO)_4$ is 35, hence it is less stable. It attains stability by -

(1) Oxidation of *Co* (2) Reduction of *Co*

(3) Dimerization (4) Both (2) and (3)

Q.35 Two solutions (A) containing $FeCl_{3(aq.)}$ and (B) containing $K_4[Fe(CN)_6]$ are separated by semi permeable membrane as shown below -

(A)	(B)
$FeCl_3$	$K_4[Fe(CN)_6]$

5 SPM

If $FeCl_3$ on reaction with $K_4[Fe(CN)_6]$ produces blue colour of $Fe_4[Fe(CN)_6]$, the blue colour will be noticed in -

(1) (A)

(2) (B)

(3) In both (A) and (B)

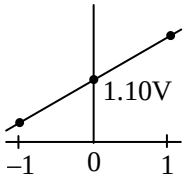
(4) Neither in (A) nor in (B)

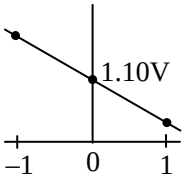
Q.36 The overall cell reaction of Daniell cell is :

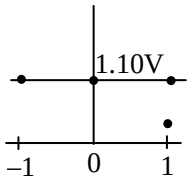
$Zn(s) + Cu^{2+} \rightleftharpoons Zn^{2+} + Cu(s)$; E° = + 1.10 volt

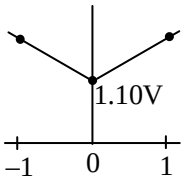
$Q = \frac{[Zn^{2+}]}{[Cu^{2+}]}$

When $\log_{10}Q$ is plotted on X-axis and E_{cell} on Y-axis, then which of the following will correctly represent the variation ?

(1) 

(2) 

(3) 

(4) 

Q.37 Half-life of reaction is halved as the initial concentration of the reactant is doubled. The order of reaction is -

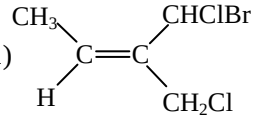
(1) 0.5 (2) 1 (3) 2 (4) 0

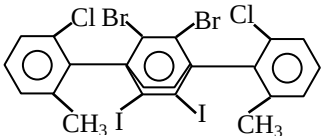
Space for rough work

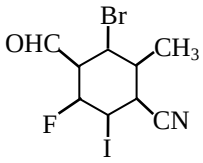
Q.38 CrO_4^{2-} (yellow)-changes to $Cr_2O_7^{2-}$ (orange) in pH = x and vice-versa in pH = y, x and y can be-

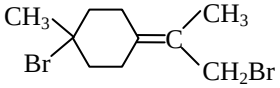
(1) 6, 5 (2) 6, 8 (3) 8, 9 (4) 7, 7

Q.39 Which of the following compounds is optically inactive ?

(1) 

(2) 

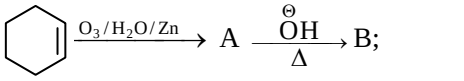
(3) 

(4) 

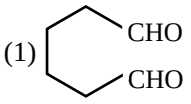
Q.40 Formaldehyde forms an addition product with CH_3MgI which on hydrolysis gives :

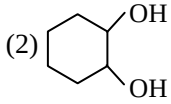
(1) ethyl iodide (2) ethyl alcohol

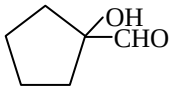
(3) methyl alcohol (4) methyl iodide

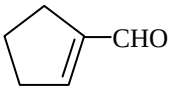
Q.41  ;

In the given sequence 'B' is :-

(1) 

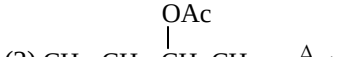
(2) 

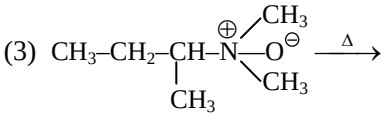
(3) 

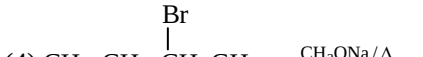
(4) 

Q.42 In which reaction product formation takes place by Saytzeff rule ?

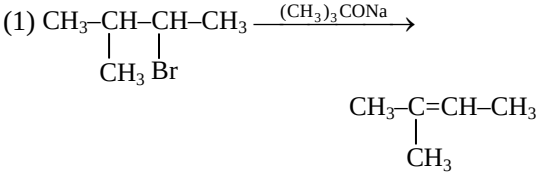
(1) 

(2) 

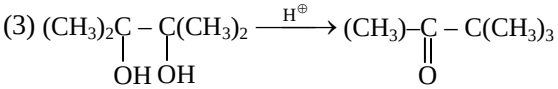
(3) 

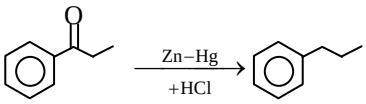
(4) 

Q.43 In which reaction product is wrong

(1) 

(2) $CH_3–Cl + (CH_3)_3CONa \rightarrow CH_3–O–C(CH_3)_3$

(3) 

(4) 

Space for rough work

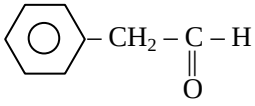
Q.44 $CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow[NaOH]{I_2}$ (A) $\xrightarrow[\Delta]{Ag\ powder}$ (B) $\xrightarrow[Hg^{+2}]{H_2O}$ (C).

Product A, B & C are -

(1) Iodoform, Acetylene & Acetaldehyde
(2) Triiodomethane, Ethyne & Acetone
(3) Iodoform, Ethene & Ethylene glycol
(4) Ethene, iodoform & Ethylhydrogen sulphate

Q.45 When of the following gives do not aldol reaction

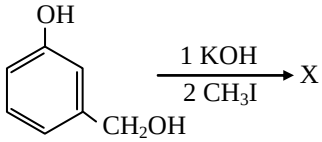
(1) $CH_3-\underset{\underset{O}{\|}}{C}-H$

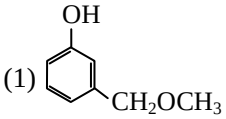
(2) 

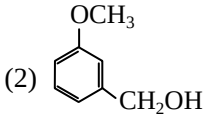
(3) $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$

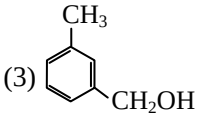
(4) $H-\underset{\underset{O}{\|}}{C}-H$

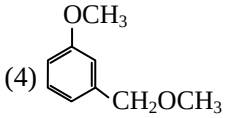
Q.46 The product X is



(1) 

(2) 

(3) 

(4) 

Q.47 Which of the following acid on heating do not form anhydride

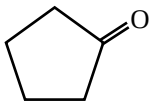
(1) Succinic acid (2) pthallic acid
(3) Maleic acid (4) Malonic acid

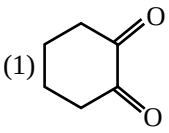
Q.48 Which of the following compounds will react with Br_2 and aqueous KOH to give a primary amine, RNH_2 ?

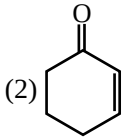
(1) $RCONHCH_3$ (2) $RCOONH_4$
(3) $RCONH_2$ (4) $RCONHOH$

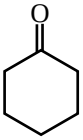
Q.49 Which is not true about acetophenone ?

(1) Reacts to form 2, 4-dinitrophenyl hydrazine
(2) Reacts with Tollen's reagent to form silver mirror
(3) Reacts with I_2/NaOH to form iodoform
(4) On oxidation with alkaline $KMnO_4$ followed by hydrolysis gives benzoic acid

Q.50  $\xrightarrow[2.\ LiAlH_4]{1.\ HCN}$ (*A*); Product '*A*' $\xrightarrow{3.\ NaNO_2 + HCl}$ will be

(1) 

(2) 

(3) 

(4) None of these

Space for rough work

SECTION-c MATHEMATICS]

Q.51 Johan has x children by his first wife. Mary has (x + 1) children by his first husband .They marry and have children of their own. The whole family has 24 children. Assuming that two children of the same parents do not fight . The maximum no. of fights are -

(1) 198 (2) 202

(3) 191 (4) 237

Q.52 The plane passing through the intersection of planes $\vec{r}.(2\hat{i}-3\hat{j}+4\hat{k})=1$ and $\vec{r}.(\hat{i}-\hat{j})+4=0$ and perpendicular to $\vec{r}.(2\hat{i}-\hat{j}+\hat{k})=-8$, is

(1) $\vec{r}.(12\hat{i}+5\hat{j}-2\hat{k})=47$

(2) $\vec{r}.(-5\hat{i}+2\hat{j}+12\hat{k})=47$

(3) $\vec{r}.(-2\hat{i}+5\hat{j}+12\hat{k})=47$

(4) $\vec{r}.(12\hat{i}-\hat{j}-2\hat{k})=47$

Q.53 $f : R - \{-a\} \to R - \{3\}$, $f(x) = \dfrac{3x-2}{x+a}$. If the reflection of y = f(x) in the line y = x is f(x) it self, then 'a' is equal to

(1) 3 (2) – 3

(3) 3/2 (4) 2/3

Q.54 $\int \dfrac{e^{\sqrt{x}}}{\sqrt{x}}(x+\sqrt{x})\,dx$ is equal to

(1) $2e^{\sqrt{x}}\left[x-\sqrt{x}+1\right]+C$

(2) $e^{\sqrt{x}}\left[x-2\sqrt{x}+1\right]+C$

(3) $e^{\sqrt{x}}\left(x+\sqrt{x}\right)+C$

(4) $e^{\sqrt{x}}\left(x+\sqrt{x}+1\right)+C$

Q.55 If $f''(x) = -f(x)$ and $g(x) = f'(x)$ and $F(x) = \left(f\left(\frac{x}{2}\right)\right)^2 + \left(g\left(\frac{x}{2}\right)\right)^2$ and given that F(5) = 5, then F(10) is equal to -

(1) 5 (2) 10 (3) 0 (4) 15

Q.56 If $f_n(x) = (n^x + n^{-x})^2$, $g_n(x) = (n^x - n^{-x})^2$, then $\begin{vmatrix} f_2(x) & g_2(x) & 1 \\ f_3(y) & g_3(y) & 1 \\ f_5(z) & g_5(z) & 1 \end{vmatrix}$ is -

(1) equal to zero

(2) independent of x, y, z

(3) $2^x3^y5^z$

(4) $\dfrac{1}{2^x3^y5^z}$

Q.57 Let A be an n order square matrix and B be its adjoint, then $|AB + KI_n|$, where K is a scalar quantity, is

(1) $(|A| + K)^{n-2}$ (2) $(|A| + K)^n$

(3) $(|A| + K)^{n-1}$ (4) $(|A| + K)^{n-3}$

Space for rough work

Q.58 Let $g(x) = 7x^2 e^{-x^2}\ \forall\ x \in R$, then $g(x)$ does not have -

(1) local maxima at $x = 1$

(2) local maxima at $x = 0$

(3) local maxima at $x = -1$

(4) two local maxima & one local minima

Q.59 The solution of the differential equation $x\frac{dy}{dx} = y(\log y - \log x + 1)$ is -

(1) $y = xe^{cx}$ (2) $y + xe^{cx} = 0$

(3) $y + e^x = 0$ (4) $y = 2xe^{cx^2}$

Q.60 A cube of ice melts without its changing shape at the uniform rate of 4 cm^3/min. The rate of change of the surface area of the cube, in cm^2/min, when the volume of the cube is 125cm^3, is -

(1) –4 (2) –16/5 (3) –16/6 (4) –8/15

Q.61 If $\int \frac{\cos^4 x\,dx}{\sin^3 x(\sin^5 x + \cos^5 x)^{3/5}}$

$= -\frac{1}{2}(1 + \cot^A x)^B + c$, then AB, is

(1) 5 (2) 2/5 (3) 2 (4) 1

Q.62 $\ell = \lim\limits_{x\to 0^+}\left[\frac{x}{\sin^{-1} x}\right]$; $m = \lim\limits_{x\to 0^+}\left[\frac{x}{\tan^{-1} x}\right]$;

$n = \lim\limits_{x\to 0^-}\left[\frac{2^x - 1}{x}\right]$ (where $[\cdot]$ denotes greatest integer function) mark incorrect option-

(1) $\ell^2 + n^2 = 0$ (2) $\ell + m + n = 1$

(3) $\ell = n$ (4) None of these

Q.63 Range of the function $f(x) = \cos^{-1} x + \text{cosec}^{-1} x$ is -

(1) $[0, \pi]$ (2) $[-\pi/2, \pi/2] - \{0\}$

(3) $\{-\pi/2, \pi/2\}$ (4) $\{\pi/2\}$

Q.64 The foot of perpendicular from P(1, 0, 2) to the line $\frac{x+1}{3} = \frac{y-2}{-2} = \frac{z+1}{-1}$ is the point -

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

(3) (–4, 4, 0) (4) (2, 0, –2)

Q.65 f is a continuous function in [a, b]; g is a continuous function in [b, c].

A function h(x) is defined as

$h(x) = \begin{cases} f(x); & x \in [a, b) \\ g(x); & x \in (b, c] \end{cases}$, if f(b) = g(b), then

(1) h(x) has a removable discontinuity at x = b

(2) h(x) may or may not be continuous in [a, c]

(3) $h(b^+) = g(b^-)$ and $h(b^-) = f(b^+)$

(4) None of these

Q.66 If $y = \frac{x}{x+5}$, then $\frac{dx}{dy}$ equals -

(1) $5(1 - y)^{-2}$ (2) $5(1 + y)^{-2}$

(3) $(1 - y)^{-2}$ (4) None of these

Space for rough work

Q.67 The number of ways in which 8 distinguishable apples can be distributed among 3 boys such that every boy should get atleast 1 apple and atmost 4 apples is $k \cdot {}^{7}P_{3}$, where k has the value equal to

(1) 14 (2) 66 (3) 44 (4) 22

Q.68 On a Saturday night, 20% of all drivers in the USA are under the influence of alcohol. The probability that a driver under the influence of alcohol will have an accident is 0.001. The probability that a sober driver will have an accident is 0.0001. If a car on a Saturday night smashed into a tree, then the probability that the driver was under the influence of alcohol, is

(1) $\frac{3}{7}$ (2) $\frac{4}{7}$ (3) $\frac{5}{7}$ (4) $\frac{6}{7}$

Q.69 If $\int \frac{x - \sin x \cos x}{x^2 \cos^2 x}\, dx = f(x) + c$ then $\lim\limits_{x \to 0} f(x)$ equals

(1) 1 (2) $\sqrt{2}$ (3) $\frac{1}{\sqrt{2}}$ (4) $\sqrt{3}$

Q.70 The system of equations

$$x - y + 3z = 4$$
$$x + z = 2$$
$$x + y - z = 0 \text{ has}$$

(1) a unique solution
(2) many finite solutions
(3) infinite solutions
(4) no solution

Q.71 Equation of the plane through the mid-point of the join of A(4, 5, – 10) and B(– 1, 2, 1) and perpendicular to AB is -

(1) $\vec{r} \cdot (5\hat{i} + 3\hat{j} - 11\hat{k}) + \frac{135}{2} = 0$

(2) $\vec{r} \cdot (5\hat{i} + 3\hat{j} - 11\hat{k}) = \frac{135}{2}$

(3) $\vec{r} \cdot \left(\frac{3}{2}\hat{i} + \frac{7}{2}\hat{j} - \frac{9}{2}\hat{k}\right) = 5\hat{i} + 3\hat{j} - 11\hat{k}$

(4) None of these

Q.72 $I = \int_{0}^{2\pi} \frac{1}{1 + e^{\sin x}}\, dx$ is equal to -

(1) π (2) 2π (3) $\frac{\pi}{2}$ (4) None

Q.73 The slope at any point of a curve y = f(x) is given by $\frac{dy}{dx} = 3x^2$ and it passes through (–1, 1). The equation of the curve is

(1) $y = x^3 + 2$ (2) $y = -x^3 - 2$
(3) $y = 3x^3 + 4$ (4) $y = -x^3 + 2$

Q.74 The area enclosed between the curves y = x and $y = 2x - x^2$ is -

(1) $\frac{1}{2}$ (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) $\frac{1}{4}$

Q.75 A fair die is tossed until a number greater than 4 appears. The probability that an even number of tosses shall be required, is -

(1) 1/2 (2) 2/5 (3) 3/5 (4) 2/3

Space for rough work

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