P23-16

PAPER-2 | **Academic Session: 2016-17** | CODE - O

JEE PREPARATORY TEST-2 (JPT-2)
(JEE ADVANCED PATTERN)

Target : JEE (Main+Advanced) 2017

Date: 14-05-2017 | Duration : 3 Hours | Max. Marks: 240

COURSE : VIJETA (ADP), VIJAY (ADR), VIVEK (JCC)

Please read the last page of this booklet for the instructions.
(कृपया निर्देशों के लिये इस पुस्तिका के अन्तिम पृष्ठ को पढ़े।)

PART - I : PHYSICS

SECTION – 1 : (Maximum Marks : 40)

Ñ   This section contains **TEN** questions

Ñ   The answer to each question is a **SINGLE DIGIT INTEGER ranging from 0 to 9 (one or more answers are there)**, both inclusive

Ñ   For each question, darken the bubble corresponding to the correct integer in the ORS

Ñ   Marking scheme :

   +4 If the bubble corresponding to the answer is darkened

    0 If none of the bubbles is darkened

   –2 In all other cases

For example, if answer is 1, 4, 7 then OMR should look like
$\begin{array}{c} 0\ 1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9 \\ \bigcirc\ \bullet\ \bigcirc\ \bigcirc\ \bullet\ \bigcirc\ \bigcirc\ \bullet\ \bigcirc\ \bigcirc \end{array}$
then (+4) marks will be

given and if, left blank "0 marks" will given else (–2) marks will be given.

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1.   Two men A and B, A standing at periphery of circle of radius R and B standing at centre of the circle. A starts moving on the periphery with constant acceleration and B starts moving with constant velocity v at an angle θ, from the line joining initial position of A and centre, such that they meet during subsequent motion, for this purpose maximum possible value of v is $\sqrt{\dfrac{aR}{\alpha\theta}}$. Here α is an integer. Find α.

Space for Rough Work

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2. Two beads each of mass m are positioned at the top of a frictionless hoop of mass M and radius R, which stands vertically on ground. The beads are pushed gently so that they slide down the hoop, one to the right and one to the left. If during subsequent motion hoop is to loose contact from ground then integer value(s) of $\frac{m}{M}$ will be α. Find α.
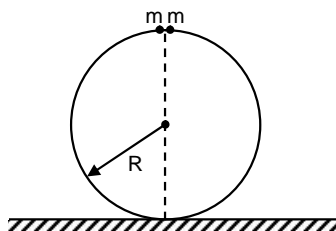
3. Two cells of emf ε_1 and ε_2 $(\varepsilon_2 < \varepsilon_1)$ are joined as shown in figure :
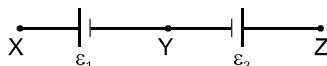

When a potentiometer is connected between X and Y it balances for 300 cm length against ε_1. On connecting the same potentiometer between X and Z it balances for 100 cm length against ε_1 and ε_2. Find possible integer value(s) of $\frac{2\varepsilon_2}{\varepsilon_1}$.

4. A convex lens of focal length f is cut along two perpendicular diameter of the aperture. Material of thickness Δ is lost in cutting operation from every cut surface . All the four pieces are then pasted along the cut planes to make a lens. A point object is placed on the axis of new lens at a distance 1.5 f. Find the number of images formed.
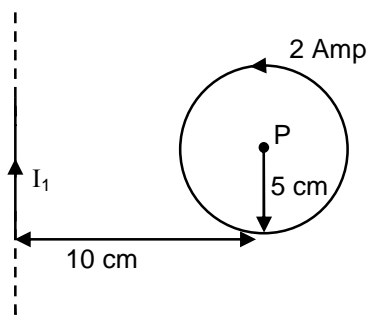

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5. Two converging lenses have focal length f_1 and f_2 ($f_1 > f_2$). The optical axis of the two lenses coincide. This lens system is used to form an image of real object. It is observed that final magnification of the image does not depend on the distance x. Whole arrangement is shown in figure. Given that $f_1 = 10cm$, $f_2 = 30cm$. Find the magnitude of final magnification.
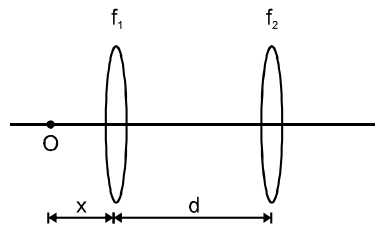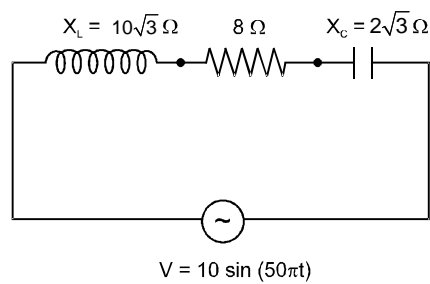

6. Magnetic field at point P is zero. If current I_1 is equal to $X\pi$ A. Then find the value of X.
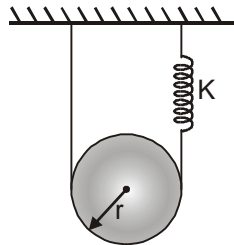

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7. In the AC circuit shown, phase difference between voltage and current is ϕ radian. What are the possible positive integer value(s) of n for which $\dfrac{(2n+1)}{\pi} \times \phi$ is an integer.

$$X_L = 10\sqrt{3}\ \Omega \qquad 8\ \Omega \qquad X_c = 2\sqrt{3}\ \Omega$$


$$V = 10 \sin (50\pi t)$$

8. A uniform cylinder of mass m and radius r is suspended from a massless string as shown. One end of the string is attached directly to a rigid support, while the other end is attached to an ideal spring of spring constant k. Time period of the small vibrations of the cylinder is $2\pi\sqrt{\dfrac{\alpha m}{2k}}$. Find value(s) of n for which (n × α) is an integer. (assume no sliding anywhere)

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9. A photon strikes a hydrogen atom in its ground state to eject the electron with kinetic energy 16.4 eV. If 25% of the photon energy is taken up by the electron, the energy of the incident photon is $(24 \times X)$ eV then 'X' is:

10. In the arrangement shown in the figure, all the contact surfaces are frictionless. Given system is released from rest. Distance travelled by wedge on horizontal surface till the time m_1 travels a distance ℓ relative to wedge is $\dfrac{x}{15}\ell$. Find x. (Use $\alpha = 53^0$, $\beta = 37^0$, $m_1 = m_2 = m_3$)
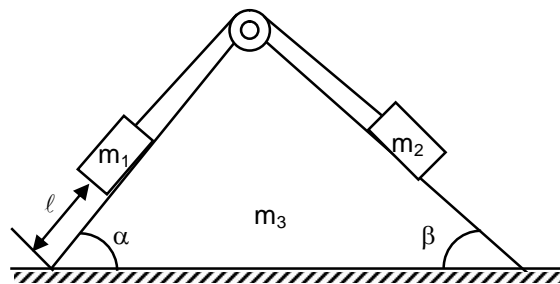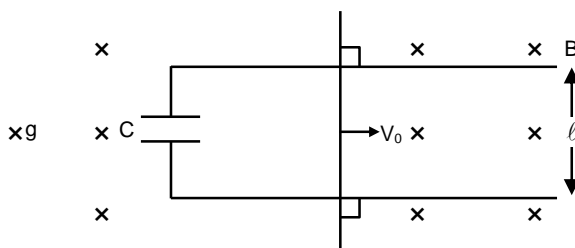

Space for Rough Work

SECTION – 2 : (Maximum Marks : 40)

Ñ   This section contains **FIVE** paragraphs

Ñ   Based on each paragraph, there will be **TWO** questions.

Ñ1   Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four option is correct 1

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Paragraph for Questions 11 and 12

Consider a long conducting rail, separation between tracks is ℓ, fixed in uniform magnetic field B directed normal to the plane of rail tracks and shunted by an uncharged capacitor of capacitance C. A conducting rod of mass m, given a velocity V_0 and then kept gently and symmetrically on track as shown. Neglect any resistance (i.e. of track and conducting rod) and any friction between rod and track. (Use : $B^2\ell^2C = 2m$)

Answer the following 2 questions based on the given arrangement.

11.   Final velocity of rod is :

   (A) V_0 (B) $\dfrac{V_0}{2}$ (C) $\dfrac{V_0}{3}$ (D) $\dfrac{V_0}{4}$

12.   Total energy loss is

   (A) 0   (B) $\dfrac{1}{8}mV_0^2$ (C) $\dfrac{1}{3}mV_0^2$ (D) $\dfrac{13}{32}mV_0^2$
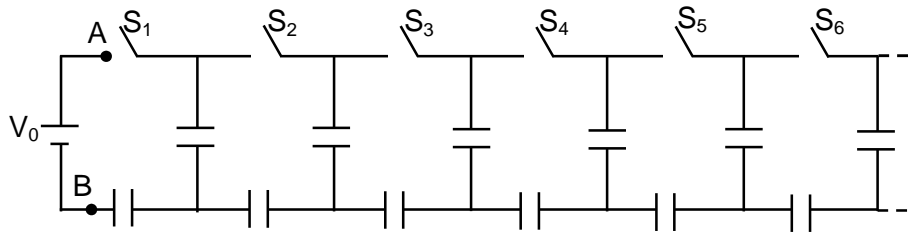

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Paragraph for Questions 13 and 14

Consider the given arrangement of very large no. of identical capacitors, each of capacitance C.

All the switches are initially opened and all capacitor are initially uncharged.

All the switches are closed simultaneously.

Answer the following questions based on the above arrangement

13. The equivalent capacitance between the points A and B is :

(A) $\left(\dfrac{\sqrt{5}-1}{2}\right)C$ 　　　(B) $\left(\dfrac{\sqrt{5}+1}{2}\right)C$ 　　　(C) $\left(\sqrt{5}-1\right)C$ 　　　(D) $\left(\sqrt{5}+1\right)C$

14. Total heat loss after closing all the switches is :

(A) $\left(\dfrac{\sqrt{2}-1}{4}\right)CV_0^2$ 　　(B) $\left(\dfrac{\sqrt{3}-1}{4}\right)CV_0^2$ 　　(C) $\left(\dfrac{\sqrt{5}-1}{4}\right)CV_0^2$ 　　(D) $\left(\dfrac{\sqrt{6}-1}{4}\right)CV_0^2$

Space for Rough Work

Paragraph for Questions 15 and 16

Consider the arrangement shown in figure. A is wedge of mass m, kept on smooth horizontal surface. B is a uniform disc of mass m and radius R. There is sufficient friction between A and B. C is a long bar of mass m, whose horizontal motion is restricted using by two rigid supports. These supports are smooth. One end of the bar is hinged at centre of B. B can rotate freely with respect to hinge. Whole system is released from rest. Answer the following two questions for the given arrangement.
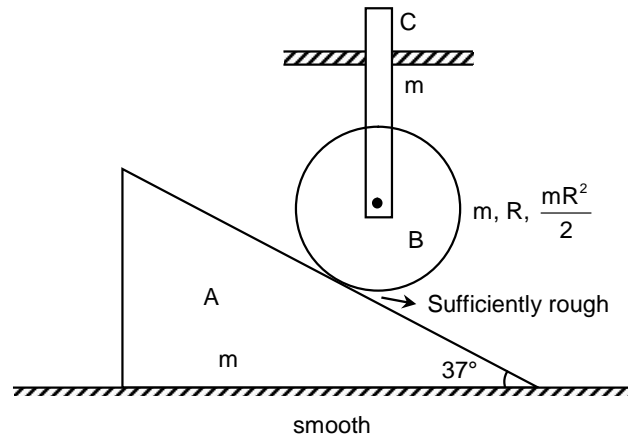
15. If at certain instant speed of wedge is v then kinetic energy of overall system i.e. (A + B + C) will be:

(A) $\frac{93}{64}mv^2$ (B) $\frac{54}{32}mv^2$ (C) $\frac{54}{64}mv^2$ (D) None of these

16. Acceleration of the wedge (Just after the system is released from rest) will be :

(A) $\frac{61}{32}g$ (B) $\frac{16}{31}g$ (C) $\frac{61}{64}g$ (D) None of these

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Paragraph for Questions 17 and 18

A particle of mass m is connected to a block of same mass by an inextensible string of length ℓ. The block is free to slide on the smooth horizontal surface. Size of the block is large enough so, that is doesn't topple and particle doesn't hit on the ground. Now the particle is released from the horizontal position of the string as shown in the figure. Answer the following two questions.
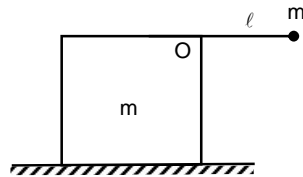
17. Speed of the block as function of θ (where θ is the angle made by the string with downward vertical) will be :

(A) $\sqrt{\dfrac{g\ell\cos\theta}{1+\tan^2\theta}}$

(B) $\sqrt{\dfrac{2g\ell\cos\theta}{1+\tan^2\theta}}$

(C) $V = \sqrt{\dfrac{g\ell\cos\theta}{1+2\tan^2\theta}}$

(D) $V = \sqrt{\dfrac{g\ell\cos\theta}{2+\tan^2\theta}}$

18. Normal reaction offered by ground onto the wedge as a function of θ. (where θ is the angle made by the string with downward vertical) will be :

(A) $mg\cos\theta\left(\dfrac{5+\sin^2\theta}{\left(1+\sin^2\theta\right)^2}\right)$

(B) $mg\left(1+\dfrac{\cos^2\theta(5+\sin^2\theta)}{(1+\sin^2\theta)^2}\right)$

(C) $mg\cos\theta\left(\dfrac{5+\sin^2\theta}{1+\sin^2\theta}\right)$

(D) $mg\left(1+\dfrac{\cos^2\theta(3+\sin^2\theta)}{(1+\sin^2\theta)^2}\right)$

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Paragraph for Questions 19 and 20

A, B, C and D are four measured quantities. The measured values of them are :

A = 6 $\pm$ 0.12 unit

B = 3 $\pm$ 0.15 unit

C = 2 $\pm$ 0.04 unit

D = 4 $\pm$ 0.12 unit

g and f are two functions given by :

$g = \dfrac{AB}{A+B}$ and $f = \dfrac{AB}{C+D}$ then :

19. Maximum percentage error in g is ....

(A) 9 %   (B) 4%   (C) 9.66%   (D) 10%

20. Maximum percentage error in f is ....

(A) 9 %   (B) 4%   (C) 9.67%   (D) 12%

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PART - II : CHEMISTRY

Atomic masses : [H = 1, D = 2, Li = 7, C = 12, N = 14, O = 16, F = 19, Na = 23, Mg = 24, Al = 27, Si = 28, P = 31, S = 32, Cl = 35.5, K = 39, Ca = 40, Cr = 52, Mn = 55, Fe = 56, Cu = 63.5, Zn = 65, As = 75, Br = 80, Ag = 108, I = 127, Ba = 137, Hg = 200, Pb = 207]

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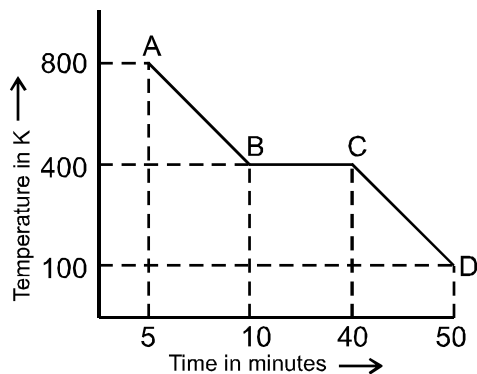For example, if answer is 1, 4, 7 then OMR should look like `0 1 2 3 4 5 6 7 8 9` then (+4) marks will be

given and if, left blank "0 marks" will given else (–2) marks will be given.

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21.   Total number of electrons in $_{24}Cr^{3+}$ with s = $+\dfrac{1}{2}$ is ………. .

(Give your answer after dividing by 3)

Space for Rough Work

22. One mole of a substance is cooled at the rate of 0.4 kJ/min as shown in the graph at constant pressure.

AB represent cooling of liquid, BC represent conversion of liquid to solid, CD represent cooling of solid. The molar entropy of fusion in J mole^{-1} K^{-1} is (Give your answer after dividing by 10):

23. How many of the following compounds give gas on heating, the gas turns moist blue litmus red.

$BaCO_3$, $MgCO_3$, NH_4HCO_3, $(NH_4)_2CO_3$, $Mg(NO_3)_2$, $MgCl_2.6H_2O$, $CaSO_4$, $(NH_4)_2Cr_2O_7$, $SrCO_3$.

24. A first order reaction is completed by 20% in 2 minutes. How much time (in minute) can be further elapsed so that its concentration does not reduce below 50% of initial concentration ? (Given : log 2 = 0.30, log 5 = 0.70)

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25. Suppose that at time t the state function of a one-particle system is:
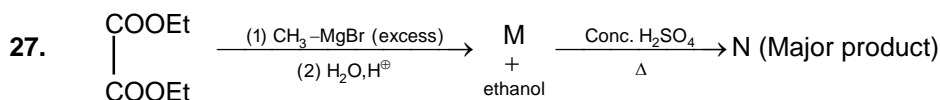
$\Psi = (2/\pi C^2)^{3/4}\, e^{-(x^2+y^2+z^2)/C^2}$ where C = 2nm.

The probability of finding the particle at any time in the tiny cubic region with it's centre at x = 1.2 nm y = −1.0 nm and z = 0 and with edges of each of length 0.004 nm is x × 10^{-y} (In scientific notation). Find y

$\{e^{-1.22} = 0.30),\ \left(\dfrac{2}{4\pi}\right)^{3/2} = 0.06\}$

26. Find the total number of elements from the given elements which can be commerically purified by zone refining method:

Si, Ge, Ga, Al, Ti, Zr, Ni, Cu, B, In

27.

$\begin{array}{l} \text{COOEt} \\ | \\ \text{COOEt} \end{array} \xrightarrow[\text{(2) H}_2\text{O,H}^{\oplus}]{\text{(1) CH}_3-\text{MgBr (excess)}} \begin{array}{c} \text{M} \\ + \\ \text{ethanol} \end{array} \xrightarrow[\Delta]{\text{Conc. H}_2\text{SO}_4} \text{N (Major product)}$

Number of π bonds present in product 'N'

Space for Rough Work

28. How many of the following compound will give positive test with ammonical silver nitrate.

(I) Ethyne   (II) Formic acid   (III) Formaldehyde

(IV) Benzaldehyde   (V) Fructose   (VI) Acetal

(VII) Glucose   (VIII) Maltose   (IX) Sucrose

29. How many of the following favours nucleophilic addition reaction with 1 equivalent of CH_3MgBr in ether.

(i)   (ii)   (iii)   (iv)

(v)   (vi)   (vii)
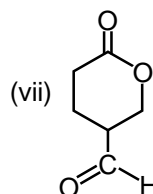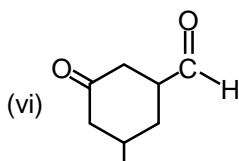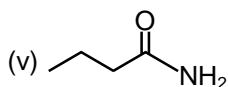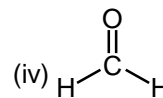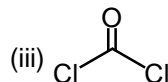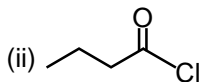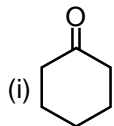
30. How many hyperconjugable H-atoms are available in this species ?
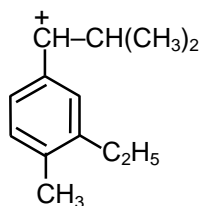
$$\overset{+}{C}H\text{--}CH(CH_3)_2$$

with aromatic ring bearing C_2H_5 and CH_3 substituents

SECTION – 2 : (Maximum Marks : 40)

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Paragraph for Question Nos. 31 to 32

The system shown in the figure is in equilibrium, where A and B are isomeric liquids and form an ideal solution at T K. Standard vapour pressure of A and B are P^0_A and P^0_B, respectively, at T K. We collect the vapour of A and B in a container of volume V. It is maintained at 2T K. At the temperature greater than T K, both A and B exist in only gaseous form.

We assume that collected gases behave ideally at 2T K and there may take place an isomerisation reaction in which A gets converted into B by first-order kinetics reaction given as : $A \xrightarrow{k} B$, where k is a rate constant. [R = 0.0821 L atm mol^{-1}K^{-1}]
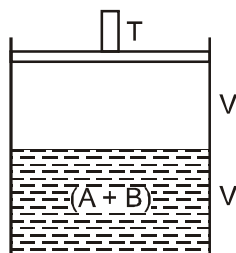
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31. If partial vapour pressure of A is twice that of partial vapour pressure of B and total vapour pressure

is 2 atm at T K, where T = 50 K and V = 8.21 L, then the number of moles of A and B in vapour

phase is respectively :

(A) $\dfrac{8}{3}, \dfrac{4}{3}$ (B) $\dfrac{4}{3}, \dfrac{1}{3}$ (C) $\dfrac{2}{3}, \dfrac{1}{4}$ (D) None of these

32. Vapours of A and B are passed into a container of volume 8.21 L, maintained at 2 T K, where T =

50 K and after 5 min., moles of B = 8/3. The pressure developed into the container after two half

lives is

(A) 3 atm   (B) 4 atm   (C) 5 atm   (D) None of these
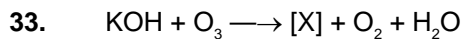
Paragraph for Question Nos. 33 to 34

Ozone is triatomic allotropic form of oxygen. It is an unstable, dark blue diamagnetic gas. O_3 is

thermodynamically unstable and decomposes to O_2 ($O_3 \longrightarrow O_2 + O$).

Due to the ease with which it liberates atoms of nascent oxygen, it acts as a powerful oxidising

agent, second only to F_2 in oxidising power.

A binary compound of oxygen with another element is called oxide. The oxides vary widely in their
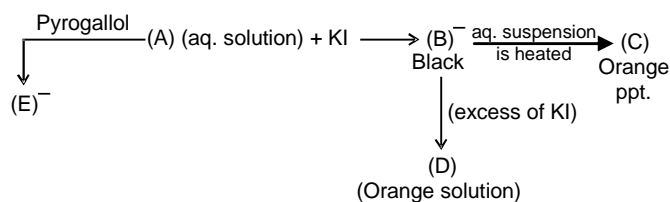
nature and properties.

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33. $KOH + O_3 \longrightarrow [X] + O_2 + H_2O$

[X] is :

(A) K_2O_3 (B) KO_3 (C) K_2O (D) K_2O_2

34. Which of the following statement is incorrect ?

(A) O_3 is used as disinfectant.

(B) NO_2 is oxidised to N_2O_5 by O_3

(C) O_3^- is paramagnetic in nature

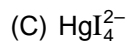(D) Dry iodine reacts with ozone and form I_2O_5

Paragraph for Question Nos. 35 to 36

35. Salt (A) contains :

(A) Bi^{3+} (B) Cu^{2+} (C) Hg^{2+} (D) Pb^{2+}

Space for Rough Work

36. The orange solution is :

(A) BiI_4^- (B) BiI_3 (C) HgI_4^{2-} (D) PbI_4^{2-}
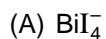
Paragraph for Question Nos. 37 to 38
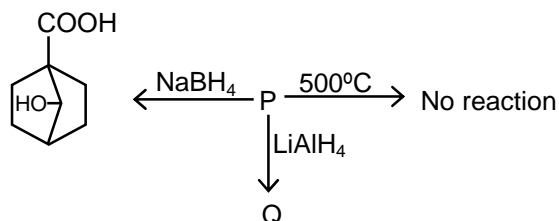
37. Total number of stereoisomers of major product Q are ?

(A) 2   (B) 4   (C) 3   (D) 6

38. Choose the correct option

(A) Major product Q is

(B) P is
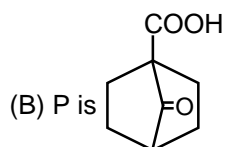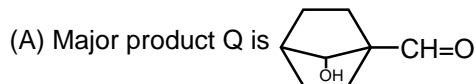
(C) Organic compound P gives CO_2 gas on heating

(D) All of these are correct.

Space for Rough Work

Paragraph for Question Nos. 39 to 40

On the bases of following information answer the given two questions.

$$\boxed{C_5H_{10}O} \xrightarrow{\text{dil.H}_2SO_4} \boxed{Q} \quad + \quad \boxed{R} \text{ R reduces Tollens reagent}$$
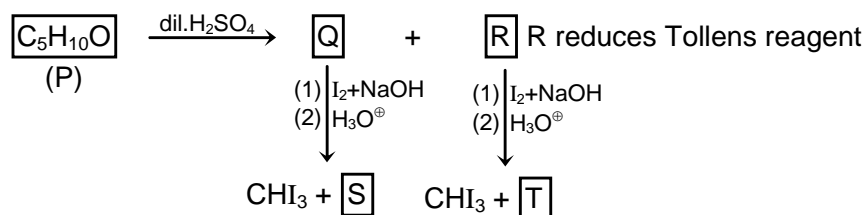(P)

Q: (1) I_2+NaOH (2) $H_3O^{\oplus}$ → CHI_3 + $\boxed{S}$

R: (1) I_2+NaOH (2) $H_3O^{\oplus}$ → CHI_3 + $\boxed{T}$

39. P will be –

(A) $CH_2=\underset{\underset{CH_3}{|}}{C}-O-CH_2-CH_3$

(B) $CH_2=CH-O-CH_2-CH_2-CH_3$

(C) $CH_2=CH-O-\underset{\underset{CH_3}{|}}{CH}-CH_3$

(D) $CH_2=CH-CH_2-O-CH_2-CH_3$
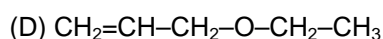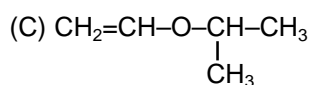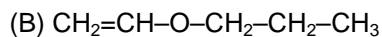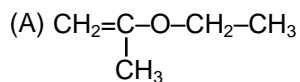
40. Which amongs the following is **incorrect** statement –

(A) [Q] is also formed when propene is reacted with dil.H_2SO_4.

(B) [Q] will also give coloured complex with neutral $FeCl_3$.

(C) The product formed by dry distillation of calcium salt of [S] will give acetone.

(D) [T] will also give silver mirror with ammonical solution of $AgNO_3$.

Space for Rough Work

PART : III MATHEMATICS

SECTION – 1 : (Maximum Marks : 40)

Ñ   This section contains **TEN** questions
Ñ   The answer to each question is a **SINGLE DIGIT INTEGER ranging from 0 to 9 (one or more answers are there)**, both inclusive
Ñ   For each question, darken the bubble corresponding to the correct integer in the ORS
Ñ   Marking scheme :
    +4 If the bubble corresponding to the answer is darkened
      0 If none of the bubbles is darkened
    –2 In all other cases

For example, if answer is 1, 4, 7 then OMR should look like
| 0 1 2 3 4 5 6 7 8 9 |
| ○ ● ○ ○ ● ○ ○ ● ○ ○ |
then (+4) marks will be

given and if, left blank "0 marks" will given else (–2) marks will be given.

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41.   If $(1 + x + x^2)^{3n+1} = a_0 + a_1x + a_2x^2 +.....a_{6n+2} \, x^{6n+2}$, then find the value of $\sum\limits_{r=0}^{2n}\left(a_{3r} - \dfrac{a_{3r+1} + a_{3r+2}}{2} \right)$ may be

42. $f : R \to R$ be a twice differentiable function satisfying
    $f''(x) - 5f'(x) + 6f(x) \geq 0 \ \forall \ x \geq 0$ if $f(0) = 1$
    $f'(0) = 0$. If $f(x)$ satisfies $f(x)$, $f(x) \geq ae^{bx} - be^{ax}, \ \forall \ x \geq 0$, then find $(a + b)$ is greater than

43.   If number of values of complex numbers ω satisfying the system of equations $z^3 = -\left(\bar{\omega}\right)^7$ and $z^5 . \omega^{11} = 1$ is k then single digit prime numbers greater than k is/are

---

Space for Rough Work

44. Let O be an interior point of $\triangle ABC$ such that $\overrightarrow{OA} + \overrightarrow{2OB} + \overrightarrow{3OC} = \vec{0}$, If the ratio of area of $\triangle ABC$ to area of $\triangle AOC$ is equal to first term of an A.P. and common difference is 2 then second, third and fourth terms are

45. In $\triangle ABC$, if $\dfrac{c+a}{12} = \dfrac{a+b}{14} = \dfrac{b+c}{18}$, then find the value of $\dfrac{7r_1 - r_2}{11r}$ is.

46. If the tangent to the curve $y = 1 - x^2$ at $x = \alpha$, where $0 < \alpha < 1$, meets the axes at P and Q. If α varies and the minimum value of the area of the triangle OPQ is k times the area bounded by the axes and the part of the curve for $0 < x < 1$, then find integral multiple of $\sqrt{3}$ k.

47. If the differential equation of a curve, passing through $\left(0, -\dfrac{\pi}{4}\right)$ and (t,0) is $\cos y\left(\dfrac{dy}{dx} + e^{-x}\right) + \sin y$ $\left(e^{-x} - \dfrac{dy}{dx}\right) = e^{e^{-x}}$, then find the value of t. $e^{e^{-t}}$

Space for Rough Work

48. The vertex A of triangle ABC is (8 , 5), median through B and angle bisector of angle B are 2x + y = 20 and x − y + 5 = 0 respectively. If co-ordinates of the point C is (λ, μ) then single digit divisors of $\dfrac{70}{103}$ (λ + μ) is/are equal to

49. Let f(x) be a function defined by f(x) = $\int\limits_{1}^{x} t(t^2 - 3t + 2)\, dt$, $1 \le x \le 3$ then the integral values of f(x) can be

50. Three numbers are chosen at random without replacement from {1, 2, ..., 10}. The probability that the minimum of the chosen number is 3, or their maximum is 7, is $\dfrac{k+5}{40}$ then k is less than or equal to

Space for Rough Work

SECTION – 2 : (Maximum Marks : 40)

Ñ   This section contains **FIVE** paragraphs

Ñ   Based on each paragraph, there will be **TWO** questions.

Ñ1 Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four option is correct 1

Ñ   For each question, darken the bubble corresponding to the correct option in the ORS

Ñ   Marking scheme :

+4 If only the bubble corresponding to the correct option is darkened

 0 If none of the bubbles is darkened

–2 In all other cases

Paragraph for Question Nos. 51 to 52

Lines whose equation are $\dfrac{x-3}{2} = \dfrac{y-2}{3} = \dfrac{z-1}{\lambda}$ and $\dfrac{x-2}{3} = \dfrac{y-3}{2} = \dfrac{z-2}{3}$ lie in same plane,

then

51. The value of $\sin^{-1}\sin\lambda$ is equal to :

(A) 3   (B) $\pi - 3$ (C) 4   (D) $\pi - 4$

52. Angle between the plane containing both lines and the plane $4x + y + 2z = 0$ is

(A) $\dfrac{\pi}{3}$ (B) $\dfrac{\pi}{2}$ (C) $\dfrac{\pi}{6}$ (D) $\cos^{-1}\left(\dfrac{1}{\sqrt{186}}\right)$

Space for Rough Work

Paragraph for Question Nos. 53 to 54

A real valued continuous function $y = f(x)$ is increasing or decreasing in an interval iff $\dfrac{dy}{dx} > 0$ or $\dfrac{dy}{dx} < 0$ respective also if f is continuous in [a, b] differentiable in (a, b) and f(a) = f(b), then the equation f '(x) = 0 has at least one value of x(i.e. root of f '(x) = 0) in (a, b) Based upon the above information answer the following questions.

53. Let $F(x) = \displaystyle\int_{\sin x}^{\cos x} e^{(1+\sin^{-1} t)^2} \, dt$ for $x \in \left[0, \dfrac{\pi}{2}\right]$, Then

(A) There exists some $c \in \left(0, \dfrac{\pi}{2}\right)$ such that F'(c) = 0

(B) There exists some $c \in \left(0, \dfrac{\pi}{2}\right)$ such that F"(c) = 0

(C) There exists some $c \in \left(0, \dfrac{\pi}{2}\right)$ such that F'''(c) = 0

(D) There is exactly one value of $c \in \left(0, \dfrac{\pi}{2}\right)$ such that F'(c) = 0

54. If a function $y = f(x)$ is such that f'(x) is continuous function and satisfies

$(f(x))^2 = m^2 + \displaystyle\int_0^x \left((f(t))^2 + (f'(t))^2\right) \, dt$, $m \in R^+$, Then

(A) f is increasing for all $x \in R$ (B) f is bounded function

(C) f is even function   (D) if m = 100, Then $f(0) = \dfrac{m}{10}$

Space for Rough Work

Paragraph for Question Nos. 55 to 56

A die is rolled and showing any number is directly proportional to that number. If prime number appears then a ball is chosen from urn A congaing 2 white and 3 black balls otherwise a ball is chosen from urn B congaing 3 white and 2 black balls Then.

55. The probability of drawing a black ball is

(A) $\dfrac{53}{105}$ (B) $\dfrac{52}{105}$ (C) $\dfrac{49}{105}$ (D) $\dfrac{51}{105}$

56. If white ball is draw then the probability that it is from urn B

(A) $\dfrac{52}{53}$ (B) $\dfrac{1}{53}$ (C) $\dfrac{20}{53}$ (D) $\dfrac{33}{53}$

Space for Rough Work

Paragraph for Questions Nos. 57 to 58

A, B, P and Q are square matrices each of order 3 × 3

57. If $|P| = 1$, $|Q| = 1$ and adjB = A, then adj(Q^{-1} B P^{-1}) is equal to

(A) PAQ
(B) PAB
(C) ABQ
(D) ABP

58. If A and P are skew symmetric matrices, then PAP is

(A) symmetric matrix
(B) skew symmetric matrix

(C) row matrix
(D) column matrix

Space for Rough Work

Paragraph for Questions Nos. 59 to 60

Let f(x) is a differential function such that $f'(x) = f(x) + \int_0^2 f(x)\,dx$, if $f(0) = \dfrac{4 - e^2}{3}$, then

59. f(x) is equal to

(A) $e^x - \left(\dfrac{e^2 - 1}{3}\right)$
(B) $e^x + \left(\dfrac{e^2 - 1}{3}\right)$
(C) $e^x - \left(\dfrac{e^2 + 1}{3}\right)$
(D) $e^x + \left(\dfrac{e^2 + 1}{3}\right)$

60. The number of solution of x + f(x) = 0 is

(A) 0
(B) 1
(C) 2
(D) infinite

Space for Rough Work

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

GENERAL :

1. The sealed booklet is your Question Paper. Do not break the seal till you are instructed to do so.

2. The question paper CODE is printed on the right hand top corner of this sheet and the right hand top corner of the back cover of this booklet.

3. Use the Optical Response Sheet (ORS) provided separately for answering the question.

4. Blank spaces are provided within this booklet for rough work.

5. Write your Name and Roll Number in the space provided on the below cover.

6. After the open booklet, verify that the booklet contains all the **60** questions along with the options are legible.

QUESTION PAPER FORMAT AND MARKING SCHEME :

7. The question paper has three parts : **Physics, Chemistry and Mathematics**. Each part has two sections.

8. Each section as detailed in the following table :

Section	Question Type	Number of Questions	Category-wise Marks for Each Question				Maximum Marks of the Section
			Full Marks	**Partial Marks**	**Zero Marks**	**Negative Marks**	
1	Single digit Integer (one or more answer are there)	10	+4 If only the bubbles corresponding to the correct answer is darkened	–	0 if not attempted	–2 In all other cases	40
2	Comprehension (Single Correct Option)	10	+4 If only the bubble corresponding to all the correct option is darkened	–	0 If none of the bubbles is darkened	–2 In all other cases	40

OPTICAL RESPONSE SHEET :

9. Darken the appropriate bubbles on the original by applying sufficient pressure.

10. The original is machine-gradable and will be collected by the invigilator at the end of the examination.

11. Do not tamper with or mutilate the ORS.

12. Write your name, roll number and the name of the examination centre and sign with pen in the space provided for this purpose on the original. **Do not write any of these details anywhere else**. Darken the appropriate bubble under each digit of your roll number.

DARKENING THE BUBBLES ON THE ORS :

13. Use a **BLACK BALL POINT** to darken the bubbles in the upper sheet.

14. Darken the bubble **COMPLETELY.**

15. Darken the bubble **ONLY** if you are sure of the answer.

16. The correct way of darkening a bubble is as shown here : ●

17. There is **NO** way to erase or "un-darkened bubble.

18. The marking scheme given at the beginning of each section gives details of how darkened and **not darkened** bubbles are evaluated.

NAME OF THE CANDIDATE : ....

ROLL NO. : ....

I have read all the instructions
and shall abide by them

I have verified the identity, name and roll number
of the candidate.

- -
Signature of the Candidate

- -
Signature of the Invigilator

DO NOT BREAK THE SEALS WITHOUT BEING INSTRUCTED TO DO SO BY THE INVIGILATOR