

**CLASSROOM CONTACT PROGRAMME**
(Academic Session : 2018 - 2019)**COMPUTER
BASED TEST**
आसान ०

JEE (Main + Advanced) : ENTHUSIAST COURSE

SCORE : II

Test Type : FULL SYLLABUS

Test Pattern : JEE-Main

TEST DATE : 10 - 02 - 2019**PAPER – 2**

Important Instructions

Do not open this Test Booklet until you are asked to do so.

1. Immediately fill in the form number on this page of the Test Booklet with *Blue/Black Ball Point Pen*. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of **90** questions. The maximum marks are **360**.
5. There are **three** parts in the question paper A,B,C consisting of **Physics, Chemistry and Mathematics** having **30 questions** in each part of equal weightage. Each question is allotted 4 (four) marks for **correct** response.
6. **One Fourth** mark will be deducted for indicated incorrect response of each question. **No deduction** from the total score will be made if no response is indicated for an item in the Answer Sheet.
7. Use **Blue/Black Ball Point Pen only** for writing particulars/markings responses on **Side-1** and **Side-2** of the Answer Sheet. **Use of pencil is strictly prohibited.**
8. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
9. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
10. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
11. **Do not fold or make any stray marks on the Answer Sheet.**

Your Target is to secure Good Rank in JEE (Main) 2019

Corporate Office : **ALLEN** CAREER INSTITUTE, "SANKALP", CP-6, Indra Vihar, Kota (Rajasthan) INDIA 324005

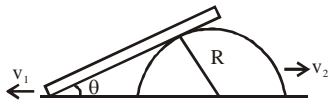
☎ +91-744-2757575 ✉ info@allen.ac.in 🌐 www.allen.ac.in

HAVE CONTROL → HAVE PATIENCE → HAVE CONFIDENCE ⇒ 100% SUCCESS

BEWARE OF NEGATIVE MARKING

PART A - PHYSICS

1. An object is projected upwards at an angle of 37° with horizontal with velocity 25 m/sec. Then find the position vector (in m) of particle after time 2 sec. ($g = 10 \text{ m/sec}^2$)
- (1) $40\hat{i} + 30\hat{j}$ (2) $40\hat{i} + 10\hat{j}$
- (3) $40\hat{i} - 10\hat{j}$ (4) $10\hat{i} + 40\hat{j}$
2. Figure shows a hemisphere & a supported rod. Hemisphere is moving towards right with a uniform velocity v_2 & the end of the rod which is in contact with ground is moving in left direction with a velocity v_1 . Find the magnitude of rate at which the angle θ is changing in terms of v_1 , v_2 , R & θ .



- (1) $\frac{(v_1 + v_2) \sin^2 \theta}{R \cos \theta}$ (2) $\frac{(v_1 - v_2) \sin^2 \theta}{R \cos \theta}$
- (3) $\frac{(v_1 + v_2) \cos^2 \theta}{R \sin \theta}$ (4) $\frac{(v_1 - v_2) \cos^2 \theta}{R \sin \theta}$

3. A neutron moving at a speed v undergoes a head on elastic collision with a mass number A at rest. Find the ratio of kinetic energies of neutron after & before collision.

(1) $\left(\frac{1+A}{1-A}\right)^2$ (2) $\left(\frac{1-A}{1+A}\right)$

(3) $\frac{1+A}{1-A}$ (4) $\left(\frac{1-A}{1+A}\right)^2$

4. Calculate the angle of banking required for a curve of 200 m radius so that a car rounding the curve at 80 kph would have no tendency to skid outward or inward. Assume the surface is friction less.

(1) $\tan^{-1}\left(\frac{40}{81}\right)$ (2) $\tan^{-1}\left(\frac{30}{81}\right)$

(3) $\tan^{-1}\left(\frac{20}{81}\right)$ (4) $\tan^{-1}\left(\frac{1}{4}\right)$

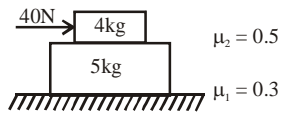
5. Which of the following forces is not conservative?

(1) $\vec{F} = 3\hat{i} + 4\hat{j}$ (2) $\vec{F} = 3x\hat{i} + 4y\hat{j}$

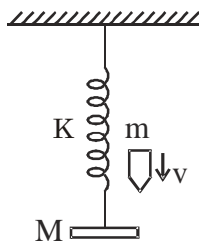
(3) $\vec{F} = 3y\hat{i} + 4x\hat{j}$ (4) $\vec{F} = 3x^2\hat{i} + 4y^2\hat{j}$

SPACE FOR ROUGH WORK

6. Find the acceleration of the two blocks of 4 kg & 5 kg mass if a force of 40 N is applied on 4 kg block. Friction coefficient between respective surfaces are shown in fig.

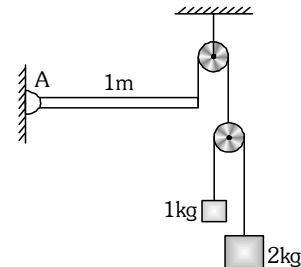


- (1) $5 \text{ m/sec}^2, 5 \text{ m/sec}^2$
 (2) $5 \text{ m/sec}^2, 2 \text{ m/sec}^2$
 (3) $2 \text{ m/sec}^2, 5 \text{ m/sec}^2$
 (4) $5 \text{ m/sec}^2, 0 \text{ m/sec}$
7. For the given system initially at rest as shown in figure, a bullet strikes the block inelastically and sticks to it then the amplitude of the system will be – (Neglect the thickness of the block)

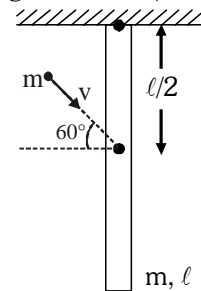


- (1) $\frac{m}{k} \sqrt{\frac{v_0^2}{M+m} + g^2}$ (2) $\frac{m}{k} \sqrt{\frac{v_0^2 k}{M+m} + g^2}$
 (3) $\frac{2m}{k} \sqrt{\frac{v_0^2}{M+m} + g^2}$ (4) $\frac{m}{2k} \sqrt{\frac{v_0^2 k}{M+m} + g^2}$

8. Consider the situation shown in the figure. Uniform rod of length $L = 1 \text{ m}$ can rotate freely about the hinge A in vertical plane. Pulleys and strings are light and frictionless. If the rod remains horizontal at rest during the motion of masses, then the mass of the rod is



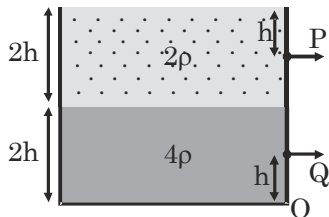
- (1) $\frac{4}{3} \text{ kg}$ (2) $\frac{16}{3} \text{ kg}$ (3) $\frac{8}{3} \text{ kg}$ (4) $\frac{32}{3} \text{ kg}$
9. A thin rod of mass m and length ℓ is hinged to a ceiling and it is free to rotate in a vertical plane. A particle of mass m , moving with speed v strikes it as shown in the figure and gets stick with the rod. The value of v , for which the rod becomes horizontal after collision is (given $\ell = 3 \text{ m}$, $m = 1 \text{ kg}$ & $g = 10 \text{ m/s}^2$)



- (1) $4\sqrt{17} \text{ m/s}$ (2) $2\sqrt{17} \text{ m/s}$
 (3) $4\sqrt{35} \text{ m/s}$ (4) $2\sqrt{35} \text{ m/s}$

SPACE FOR ROUGH WORK

10. A large tank is filled with two liquids of specific gravities 2ρ and 4ρ . Two holes are made on the wall of the tank as shown. Find the ratio of the distance from O of the points on the ground where the jets from holes P & Q strike.

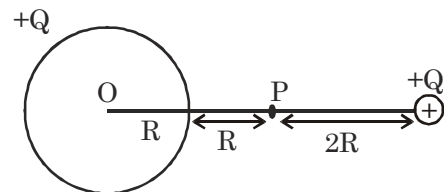


- (1) $\sqrt{3} : \sqrt{4}$ (2) $\sqrt{3} : \sqrt{2}$
 (3) $\sqrt{3} : 2$ (4) None of these
11. The displacement of a particle varies with time as $x = (15 \sin \omega t - 20 \sin^3 \omega t)$ cm.
 (a) Its motion is SHM
 (b) Its motion is not SHM
 (c) Maximum acceleration is $45\omega^2$
 (d) Time period of its motion is $(2\pi/\omega)$
 Choose the correct option :
 (1) (a) & (c)
 (2) (b) & (d)
 (3) (a), (c) & (d)
 (4) (b), (c) & (d)

12. Two capillary tubes of same diameter are put vertically one each in two liquids whose relative densities are 0.4 and 0.3 and surface tensions are 50 dyne/cm and 25 dyne/cm respectively. Ratio of heights of liquids in the two tubes $\frac{h_1}{h_2}$ is :-

(Take angle at contact = 0°)

- (1) $\frac{3}{2}$ (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) $\frac{3}{4}$
13. A metal sphere is given charge $+Q$ as shown in the figure. A point charge $+Q$ is placed at a distance $4R$ from the centre of the sphere choose correct statement(s).

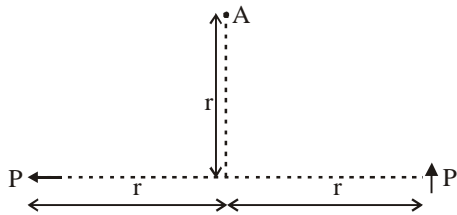


Metal sphere

- (i) Net electric field at point P is zero
 (ii) In absence of point charge field at O is non zero.
 (iii) In presence of point charge field at P is towards metal sphere
 (iv) In presence of point charge field at O is zero
 (1) i, iii, iv are correct
 (2) i, ii are correct
 (3) ii, iii are correct
 (4) iii, iv are correct

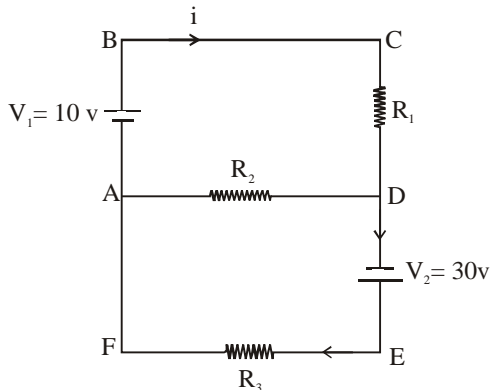
SPACE FOR ROUGH WORK

14. P is the dipole moment of two small dipoles shown in the figure. What is the potential at point A?



- (1) 0 (2) $\frac{Kp}{\sqrt{2}r^2}$ (3) $\sqrt{2}\frac{Kp}{r^2}$ (4) $2\frac{Kp}{r^2}$

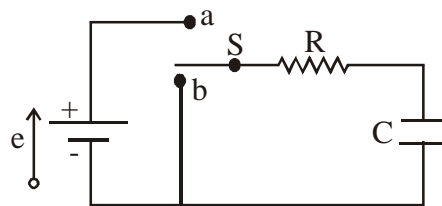
15. Two ideal batteries of emf V_1 and V_2 and three resistances R_1 , R_2 and R_3 are connected as shown in the below figure. The current in resistance R_2 is zero. If colour code of R_1 is red, green, yellow then colour code of R_3 will be.



- (1) Gray, Red, Violet
(2) Red, Green, Yellow
(3) Violet, Green, Yellow
(4) Green, Violet, Yellow

16. The table gives four sets of values for the circuit elements in figure. Rank the sets according to (as the switch is closed on point 'a' initially for long time) the time required for the current to decrease to half of its initial value, when switch is shifted at b, greatest first. Take time t_1 , t_2 , t_3 and t_4 respectively for four sets 1, 2, 3 & 4

	1	2	3	4
emf(V)	12	12	10	10
R(Ω)	2	3	10	5
C(μ F)	3	2	0.5	2



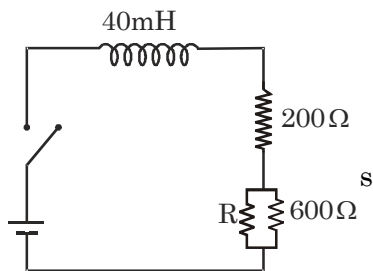
- (1) $t_4 > t_2 > t_1 > t_3$ (2) $t_4 > t_1 = t_2 > t_3$
(3) $t_3 > t_2 > t_1 > t_4$ (4) $t_3 > t_2 = t_1 > t_4$

17. Choose the correct statement

- (1) In most of northern hemisphere the northpole of the dip needle tilt upwards
(2) In most of northern hemisphere the northpole of the dip needle tilt downwards
(3) In most of southern hemisphere the northpole of the dip needle tilt downwards
(4) At equator the northpole of the dip needle tilts downwards.

SPACE FOR ROUGH WORK

18. A domain in ferromagnetic iron is in the form of a cube of side length $1 \mu\text{m}$. The molecular mass of iron is 56 g/mole and its density is 8 g/cm^3 . Assume that each iron atom has a dipole moment of $9.1 \times 10^{-23} \text{ Am}^2$. Take Avogadro number 6×10^{23} .
- (i) Number of atoms in domain = 8.2×10^{12}
 (ii) Maximum possible dipole moment of the domain = $7.8 \times 10^{-12} \text{ Am}^2$
 (iii) Maximum magnetisation of domain is = $7.8 \times 10^6 \text{ A/m}$.
- (1) all are correct
 (2) only (i) & (ii) are correct
 (3) only (ii) & (iii) are correct
 (4) only (i) & (iii) are correct
19. When switch S is closed, then for what value of R will the time constant will be $100 \mu\text{s}$.



- (1) 400Ω (2) 300Ω
 (3) 200Ω (4) 100Ω

20. In an AC circuit, $C = \frac{25}{\pi} \mu\text{F}$ and $R = 300\Omega$ are connected in series with AC source of 200V and 50 sec^{-1} frequency. The power dissipated and power factor in circuit will be :
- (1) $48 \text{ W}, 0.4$ (2) $24 \text{ W}, 0.6$
 (3) $48 \text{ W}, 0.6$ (4) $24 \text{ W}, 0.4$
21. In an LC oscillator, $L = 12 \text{ mH}$ & $C = 1.6 \mu\text{F}$ and $R = 1.5 \Omega$. Find the time in which max charge on capacitor falls to half of its initial value (approximately)
- (1) 5 ms (2) 11 ms
 (3) 17 ms (4) 23 ms
22. Which statement regarding work function (ϕ) is correct?
- (1) Work function depends on intensity of incident radiation
 (2) Work function depends on frequency of incident radiation
 (3) Work function depends on area of metal surface
 (4) Work function depends on the surface of the metal.

SPACE FOR ROUGH WORK

23. Suppose the energy of k_{α} x-rays of two elements P & Q are 826.2 eV and 2947.8 eV then the number of elements lying between P & Q according to their atomic number is
 (1) 5 (2) 6 (3) 7 (4) 8
24. Angular magnification for an astronomical telescope is 5 and the tube length for image at infinity is 36cm. Then find tube length for image formed at least distance of distinct vision for normal eye (25 cm)
 (1) 36.4 cm (2) 34.8 cm
 (3) 30.2 cm (4) 38 cm
25. A light of wavelength 5000 Å falls on a glass slab of refractive index 1.5 making angle of refraction 60° . The width of slab so as the reflected rays appear dark is
 (1) 10^{-8} m (2) 4×10^{-7} m
 (3) $\frac{10}{3} \times 10^{-7}$ m (4) 6×10^{-7} m
26. A parallel beam of monochromatic light of wavelength 450 nm passes through a long slit of width 0.2 mm. Find the angular divergence in which most of the light is diffracted :-
 (1) 4.5×10^{-3} rad (2) 2×10^{-3} rad
 (3) 3×10^{-3} rad (4) 2.25×10^{-3} rad
27. The value of one division of a vernier scale in a device is $(0.4)^{\circ}$ and 20 divisions of main scale are equal to 25 divisions of vernier. Then leastcount of device is :
 (1) $(0.5)^{\circ}$ (2) $(0.4)^{\circ}$
 (3) $(0.2)^{\circ}$ (4) $(0.1)^{\circ}$
28. Which of the following band gap semiconductor is suitable for LED?
 (1) 1.2 eV
 (2) 2 eV
 (3) 4 eV
 (4) Any of the above
29. Transistors are :
 (1) Current controlling devices
 (2) Voltage controlling device
 (3) Resistance controlled device
 (4) none of these
30. In an amplitude modulated wave for audio-frequency of 500 Hz, the appropriate carrier wave frequency will be :-
 (1) 50 Hz
 (2) 100 Hz
 (3) 500 Hz
 (4) 50,000 Hz

SPACE FOR ROUGH WORK

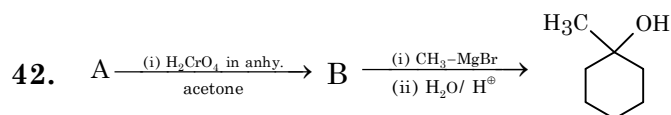
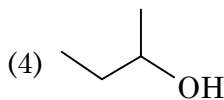
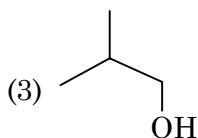
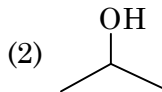
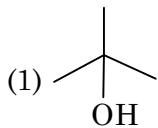
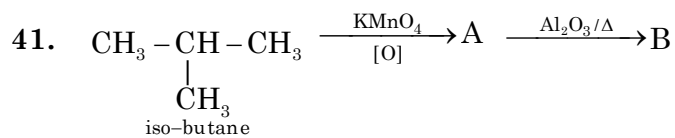
PART B - CHEMISTRY

- 31.** One mole of gas 'A' and 2 moles of SO_2 are placed in a container, gaseous mixture effusing out initially from a pinhole made in container has ratio of A & SO_2 in 1 : 1 mole ratio. The gas 'A' can be :
- (1) H_2 (2) CH_4
 (3) He (4) D_2
- 32.** $\text{SO}_2(g) + \text{Cl}_2(g) \rightleftharpoons \text{SO}_2\text{Cl}_2(g)$
- Backward reaction is endothermic. If some quantity of Cl_2 is added keeping volume of container constant which of the following statement is correct.
- (1) No effect on instantaneous pressure of container
 (2) Temp of container will increase
 (3) Temp of container will decrease
 (4) No effect on temperature of container
- 33.** If uncertainty in position of electron is equal to half of its de Broglie wave length. The minimum percentage error in its measurement of velocity under this condition, will be approximately
- (1) 4%
 (2) 8%
 (3) 16%
 (4) 32%
- 34.** Assuming that bond enthalpy of axial P-Cl bond is different from bond enthalpy of equatorial P-Cl bond, bond enthalpy of axial P-Cl bond in PCl_5 will be :
- (given $\Delta H_f \text{PCl}_3(g) = -320 \text{ KJ/mol}$
 $\Delta H_f \text{P}(g) = 315 \text{ KJ/mol}$
 $\Delta H_f \text{PCl}_{5(g)} = -400 \text{ KJ/mol}$
 $\Delta H_{\text{atomization}} \text{Cl}_2 = 240 \text{ KJ/mol}$
- & bonds of PCl_3 are same as equatorial bonds of PCl_5
- (1) 331.67 KJ/mol
 (2) 160 KJ/mol
 (3) 90 KJ/mol
 (4) 40 KJ/mol
- 35.** On doubling the temperature of reaction from initial temperature of 200 K, fraction of activated molecule become \sqrt{e} times of its initial value, activation energy of reaction is (in calories) -
- [Given $R \approx 2 \text{ cal } k^{-1} - \text{mol}^{-1}$]
- (1) 200 cal
 (2) 400 cal
 (3) 800 cal
 (4) 100 cal

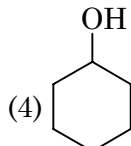
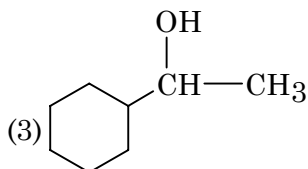
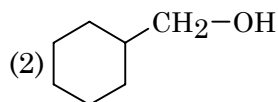
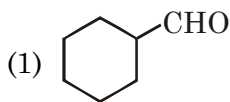
SPACE FOR ROUGH WORK

36. Aqueous solution of NaCl is electrolysed by using a variable current source where current as expressed as $i = (2+t)$. If electrolysis is carried out for 20 second then select correct statement- (i = current in ampere and t = time in seconds)
- (1) Number of moles of H_2 released at cathode is $\frac{12}{9650}$
 - (2) Number of moles of Cl_2 liberated at anode is $\frac{24}{9650}$
 - (3) Number of moles of Cl_2 liberated at cathode is $\frac{12}{9650}$
 - (4) Number of moles H_2 released at anode is $\frac{24}{9650}$
37. Choose the correct statement among the following-
- (1) Enthalpy of formation of a compound always have positive value.
 - (2) Standard enthalpy of formation of $OH^-_{(aq)} = 0$
 - (3) Enthalpy of formation of carbon mono oxide gas at 300 K is -110 kcal/mol then internal energy change for same process will be -109.7 kcal/mol
 - (4) Standard enthalpy of formation of $H^+_{aq} = 0$
38. Emf of given cell
- $$Zn_{(s)} | Zn^{++}(0.1M) || Fe^{++}(0.01M) | Fe_{(s)}$$
- is 0.3 volt. The value of equilibrium constant of cell reaction will be—
 (Take $\frac{2.303RT}{F} = 0.06$)
- (1) 10^{11}
 - (2) 10^{-11}
 - (3) $10^{-5.5}$
 - (4) $10^{5.5}$
39. What will be the total number of ammonia molecules required to completely cover surface area of 20 gm charcoal by monolayer formation. Given that 1 gm charcoal has surface area $10^3 m^2$ and radius of ammonia molecule is r nm.
 (Given that : ammonia molecules form hexagonal close packing in two dimension)
- (1) $\frac{2 \times 10^{22}}{\pi r^2}$
 - (2) $\frac{10^{22}}{\sqrt{3} r^2}$
 - (3) $\frac{2 \times 10^3}{\pi r^2}$
 - (4) $\frac{4 \times 10^{18}}{\pi r^2}$
40. 100 mL, 0.1 M CH_3COONH_4 solution has pH x_1 . Now by keeping temperature constant 400mL of water was added to solution and on calculation pH was found to be x_2 . The ratio of x_1 to x_2 will be –
 (given $Pka_{(NH_4^+)} = 9.3$, $Pka_{(CH_3COOH)} = 4.7$)
- (1) 1
 - (2) 7/5
 - (3) 12/7
 - (4) 2/3

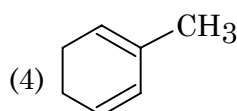
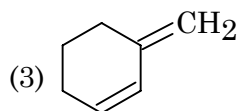
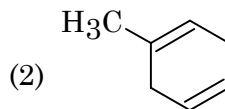
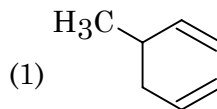
SPACE FOR ROUGH WORK



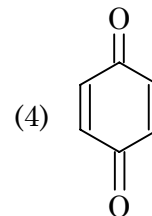
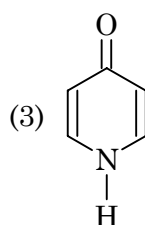
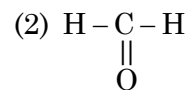
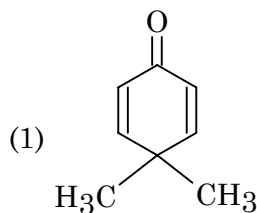
identify structure of "A"



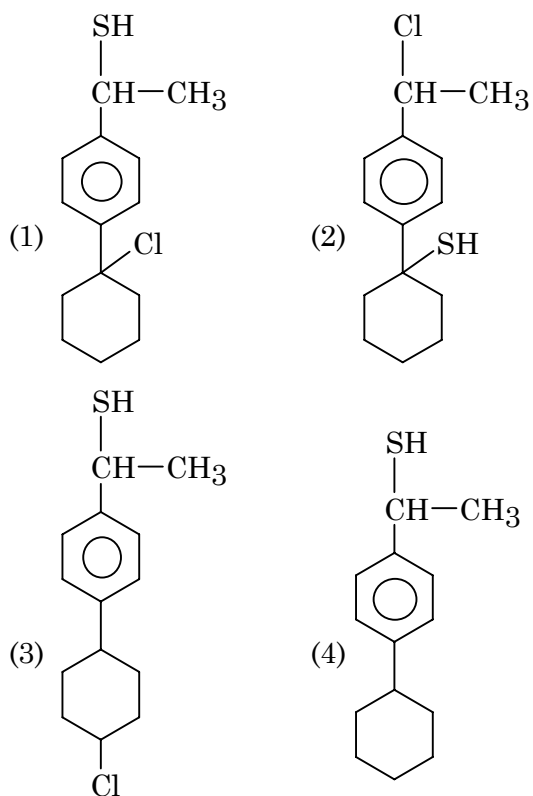
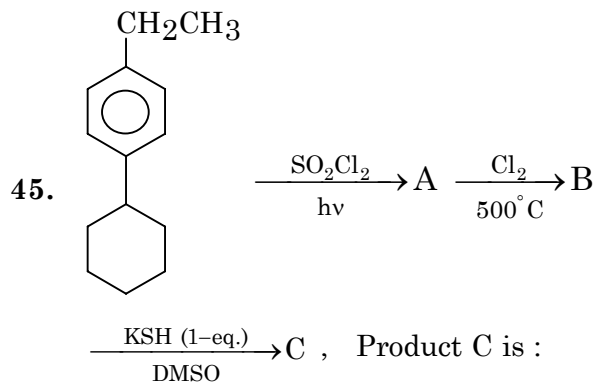
43. Which of the following alkene is most stable ?



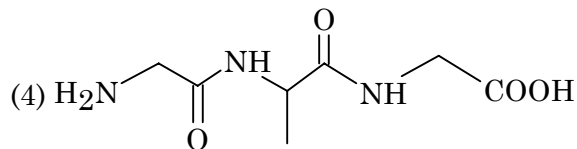
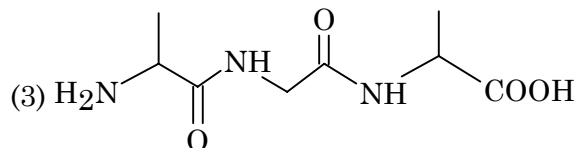
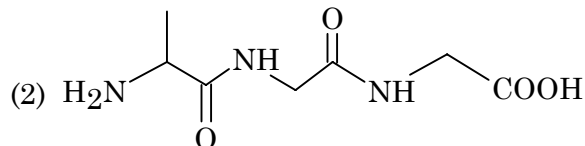
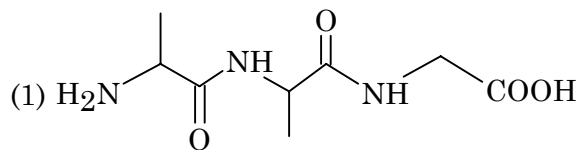
44. Which of the following compound show tautomerism



SPACE FOR ROUGH WORK

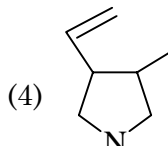
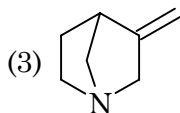
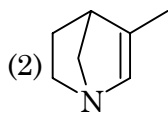
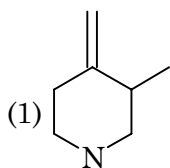
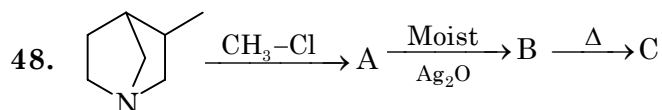
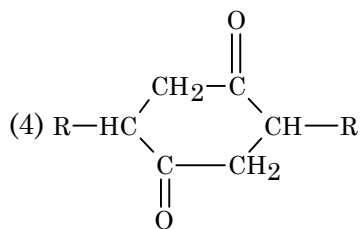
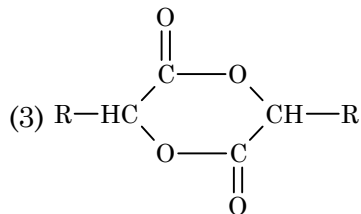
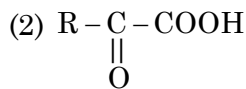
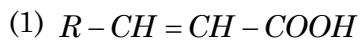


46. The correct structure of tripeptide made up of Alanine-Glycine-Alanine is :

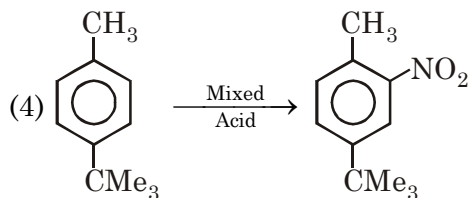
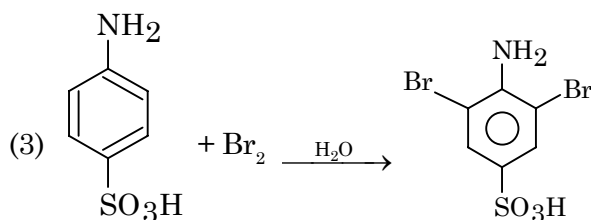
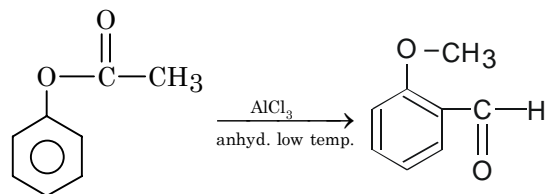
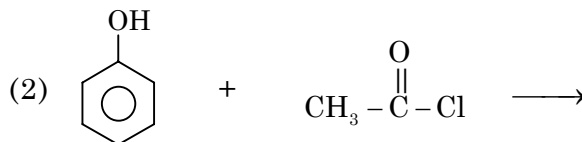
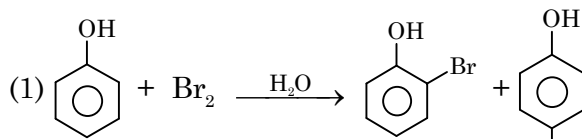


SPACE FOR ROUGH WORK

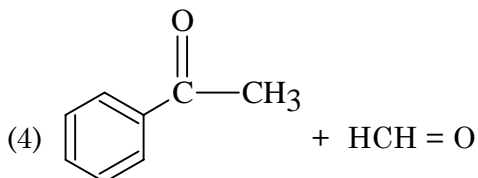
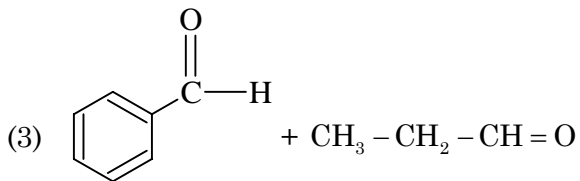
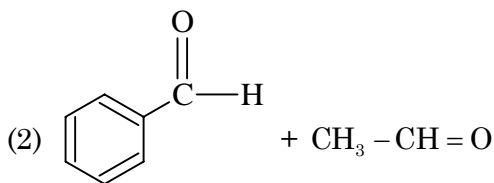
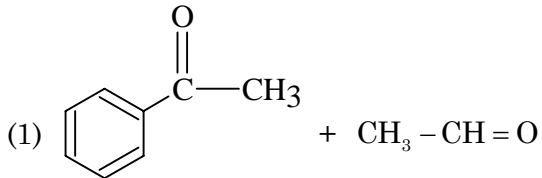
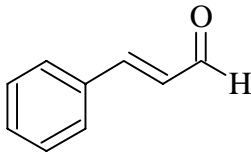
47. Compound RCH_2CO_2H (A) on reaction with Br_2 /Red P gives B which on reaction with aq KOH gives C which on heating gives D. Find out D.



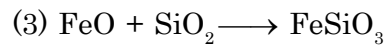
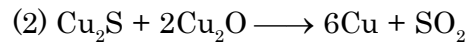
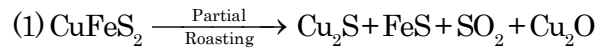
49. Out of the following which is correct :



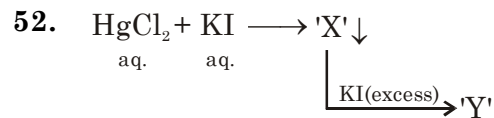
SPACE FOR ROUGH WORK



51. During the extraction of Cu from CuFeS_2 which of the following reaction does not occur :-



(4) None of these



Select correct option :-

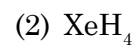
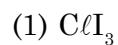
(1) 'Y' is a mixture of black ppt. and water soluble complex

(2) 'X' is green ppt.

(3) 'Y' have sp^3 hybridisation of Hg

(4) Neutral solution of 'Y' is used to detect NH_3 gas

53. Which of the following does not exist?



(4) Both (1) and (2)

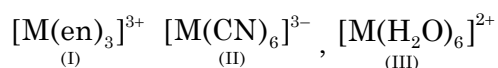
54. Octahedral complex $\text{Ma}_x\text{b}_y\text{c}_z$ have two geometrical isomers, both are optically inactive then correct set of x, y, z is :-

(1) 4,2,0 (2) 3,3,0

(3) 0,2,4 (4) All set of these are correct

SPACE FOR ROUGH WORK

55. For three complex compounds



CORRECT information is :-

- (1) Order of Δ_0 will be I > II > III
 - (2) Order of λ_{abs} will be III > II > I
 - (3) All complex will show optical isomerism
 - (4) All complex will not show geometrical isomerism
56. Which one has highest 2nd I.P value?
- (1) Mn
 - (2) Cr
 - (3) V
 - (4) Ti
57. Which is the **CORRECT** maximum prescribed concentration of metals in ppm in drinking water
- (1) Al = 0.2
 - (2) Fe = 0.3
 - (3) Zn = 10
 - (4) Cu = 6

58. The metal chloride which produces apple green coloured flame when directly subjected to flame.

- (1) Barium
 - (2) Strontium
 - (3) Calcium
 - (4) Sodium
59. What are the names assigned to elements after uranium
- (1) Transition elements
 - (2) Inner transition elements
 - (3) Trans uranic elements
 - (4) Transfermium elements
60. Which of the following molecule has bond order (2) & is diamagnetic
- (1) O_2
 - (2) C_2
 - (3) F_2
 - (4) Li_2

SPACE FOR ROUGH WORK

PART C - MATHEMATICS

61. Let $f_1 = \sum_{i=1}^3 a_i x_i$, $f_2 = \sum_{i=1}^3 b_i x_i$ and $f_3 = \sum_{i=1}^3 c_i x_i$.

If the equations $f_1 = f_2 = f_3 = 0$ has a non-trivial solution, then

$$(1) \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} \neq 0 \quad (2) \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$$

$$(3) \begin{vmatrix} a_1 & b_1 & c_3 \\ a_2 & b_2 & c_2 \\ a_1 & b_3 & c_3 \end{vmatrix} = 0 \quad (4) \begin{vmatrix} a_1 & b_1 & 1 \\ a_2 & b_2 & 1 \\ a_3 & b_3 & 1 \end{vmatrix} = 0$$

62. If p : It rains today, q : I go to school, r : I shall meet any friends and s : I shall go for a movie, then which of the following is the proposition :

If it does not rain or if I do not go to school, then I shall meet my friend and go for a movie.

- (1) $\sim(p \wedge q) \Rightarrow (r \wedge s)$
 (2) $\sim(p \wedge \sim q) \Rightarrow (r \wedge s)$
 (3) $\sim(p \wedge q) \Rightarrow (r \vee s)$
 (4) none of these

63. Let $f(x) = \sin 2x$ and $g(x) = \ln x$, then total number of solutions of $f(|x|) = |g(x)|$ will be $(x \in (0, \pi))$

- (1) 1 (2) 2 (3) 3 (4) 4

64. Probability that a student is passed in mathematics is $1/4$ and probability that he is passed in physics is $1/5$. Probability that he is passed in both the subjects is $3/20$. What is the probability that he is passed in mathematics if he has been failed in physics.

- (1) $3/4$ (2) $1/8$ (3) $3/16$ (4) $5/8$

65. Let z_1, z_2 are any complex numbers which satisfies the following conditions $|z_1| = 12$ and $|z_2 - \sqrt{3} - i| = 5$ respectively then range of values of $|z_1 - z_2|$ will be

- (1) $[6, 18]$ (2) $[5, 19]$
 (3) $\{5, 19\}$ (4) $(5, 19)$

66. Let $A(h, k)$, $B(1, 1)$ and $C(2, 1)$ be vertices of a right angled triangle with AC as its hypotenuse. If area of triangle is 2, then value of $h^2 + k^2$ will be.

- (1) 25 (2) 9 (3) 26 (4) 11

67. Let $3x + 4y + z - 3 = 0$ ($P_1 = 0$) and $6x + 8y + 2z - 5 = 0$ ($P_2 = 0$) be the two given planes, then equation of plane which divides the distance between the planes $P_1 = 0$ and $P_2 = 0$ in the ratio 2 : 3 is

- (1) $3x + 4y + z + 14 = 0$
 (2) $15x + 20y + 5z - 14 = 0$
 (3) $3x + 4y + z - 14 = 0$
 (4) $15x + 20y + 5z + 14 = 0$

SPACE FOR ROUGH WORK

68. The greatest value of $f(x) = \log_{\sqrt{48}}(x^2 - 4x + 3)$ on interval $[-5, 5]$ is
- (1) 1 (2) $\frac{1}{2}$
 (3) 2 (4) 4
69. $\tan^{-1}\frac{3}{5} + \tan^{-1}\frac{3}{29} + \tan^{-1}\frac{3}{71} + \tan^{-1}\frac{3}{131} + \dots$ in terms =
- (1) $\tan^{-1}\frac{3}{2+3n}$ (2) $\tan^{-1}\frac{3n}{2n+3}$
 (3) $\tan^{-1}\frac{3n}{1+4n}$ (4) $\tan^{-1}\frac{3n}{2+3n}$
70. Area bounded by curve $y^2 = 4x$ and lines $y = x$ and $y = 2x$ is
- (1) 1 (2) $\frac{7}{3}$
 (3) $\frac{8}{3}$ (4) $\frac{1}{3}$
71. If $y(x)$ is solution of $x \frac{dy}{dx} + 3y = x$, $y(2) = 1$ then value of $y(1)$ is
- (1) $\frac{17}{4}$ (2) 4
 (3) 9 (4) -9
72. A vertical lamp post of height 8m stands at the centre of a equilateral triangular field. The angle of elevation of its top from each vertices of triangle is 45° . The area of triangular field is :
- (1) $16\sqrt{3}$ (2) $32\sqrt{3}$
 (3) $48\sqrt{3}$ (4) $72\sqrt{3}$
73. If shortest distance between the skew lines $r = (4\hat{i} - \hat{j}) + \lambda(\hat{i} + 2\hat{j} - 3\hat{k})$ and $r = (\hat{i} - \hat{j} + 2\hat{k}) + \mu(2\hat{i} + 4\hat{j} - 5\hat{k})$ is ℓ , then value of $[\ell]$ is : (where $[\]$ is greatest integer function)
- (1) 1 (2) 2 (3) 3 (4) 4
74. If A is a square matrix of order n such that $|\text{adj}(\text{adj}A)| = |A|^{p^2}$, (where P is a prime number), then n can not be :
- (1) 4 (2) 8 (3) 10 (4) 12
75. If $A_n = \int_0^{\pi/2} \frac{\sin(2n-1)x}{\sin x} dx$ then value of $\frac{A_{1000}}{A_{10}}$ is -
- (1) 1 (2) 10
 (3) 100 (4) None

SPACE FOR ROUGH WORK

76. If 9th, 13th and 15th terms of an A.P. are first three terms of a G.P. whose sum of infinite terms is 80, then first term of A.P. is :
- (1) 40 (2) 64
 (3) 80 (4) 96
77. If a variable tangent of the circle $x^2 + y^2 = 1$ intersect the ellipse $x^2 + 2y^2 = 4$ at P and Q, then locus of point of intersection of tangents at P and Q is an ellipse whose eccentricity is equal to :
- (1) $\sin 36^\circ$ (2) $\cos 36^\circ$
 (3) $\cos 60^\circ$ (4) $\sin 60^\circ$
78. $\lim_{x \rightarrow 0} \frac{\cos 5x \cos 2x - \cos 7x \cos 10x}{\ln^2(\sin x + \cos x)^2}$ is equal to :
- (1) 10 (2) 15
 (3) 20 (4) 24
79. The value of μ for which the line $y = \mu x + 2$ become a tangent to the hyperbola $4x^2 - 9y^2 = 36$ is
- (1) $\pm \frac{2}{3}$ (2) $\pm \frac{2\sqrt{2}}{3}$
 (3) $\pm \frac{8}{9}$ (4) $\pm \frac{4\sqrt{2}}{3}$
80. If $\vec{x} = \hat{i} - \hat{j}$, $\vec{y} = \hat{i} + \hat{j} + k$ are two vectors and \vec{z} is another vector such that $\vec{x} \times \vec{z} + \vec{y} = \vec{0}$ and $\vec{x} \cdot \vec{z} = 0$, then $|\vec{z}|^2$ is equal to
- (1) $\frac{19}{2}$ (2) $\frac{15}{2}$
 (3) $\frac{3}{2}$ (4) $\frac{1}{2}$
81. Let $f(x) = ax + b$ is a function such that $f^{-1}(2) = 3$, $f^{-1}(-3) = 6$, where $f^{-1}(x)$ is the inverse of function f then $a + b$ is equal to
- (1) $\frac{3}{2}$ (2) $\frac{16}{3}$
 (3) $\frac{14}{3}$ (4) $\frac{7}{3}$
82. If the tangent to the curve $y^2 = x^3$ at the point (α^2, α^3) is also normal to the curve at the point (β^2, β^3) , then the value of $\alpha\beta$ is
- (1) $-\frac{1}{9}$ (2) $-\frac{2}{9}$
 (3) $-\frac{1}{3}$ (4) $-\frac{4}{9}$

SPACE FOR ROUGH WORK

83. If x and y are positive integers, then ${}^x C_r + {}^x C_{r-1} + {}^y C_1 + {}^x C_{r-2} + {}^y C_2 + \dots + {}^y C_r$ is equal to
- (1) $\frac{x!y!}{r!}$ (2) $\frac{(x+y)!}{r!}$
- (3) ${}^{x+y} C_r$ (4) ${}^{xy} C_r$
84. The mean and variance of a random variable x having a binomial distribution are 4 and 2 respectively, then the value of $P(x=1)$ is
- (1) $\frac{1}{4}$ (2) $\frac{1}{16}$ (3) $\frac{1}{8}$ (4) $\frac{1}{32}$
85. Each of " n " urns contain 4 white and 6 black balls. The $(n+1)^{\text{th}}$ urn contain 5 white and 5 black balls. One of the urn is chosen at random and two balls are drawn from it without replacement. Both the balls turn out to be black. If the probability that the $(n+1)^{\text{th}}$ urn was chosen to draw the ball is $\frac{1}{16}$, then value of n is
- (1) 10 (2) 11 (3) 12 (4) 13
86. How many three digit numbers satisfy the property that the middle digit is arithmetic mean of the first and the last digit
- (1) 41 (2) 45 (3) 43 (4) 44
87. If $2f(x) + xf\left(\frac{1}{x}\right) - 2f\left\{\sqrt{2}\sin\pi\left(x+\frac{1}{4}\right)\right\} = 4\cos^2\frac{\pi x}{2} + x\cos\frac{\pi}{x} \forall x \in R - \{0\}$, then $f(2) + f(1) + 3f\left(\frac{1}{2}\right) = \dots$
- (1) 1 (2) 0 (3) 2 (4) 4
88. A parabola touch lines $x - y = 0$ and $x + y + 2 = 0$ at points $M(1, 1)$ and $N(0, -2)$ respectively, then the equation of the directrix is :
- (1) $3x + y + 4 = 0$ (2) $x - 3y - 2 = 0$
 (3) $8x - y + 7 = 0$ (4) None of these
89. If $\cos^4\theta + \alpha, \sin^4\theta + \alpha$ are the roots of equation $x^2 + 4x + 2 = 0$ and $\cos^2\theta + \beta, \sin^2\theta + \beta$ are the roots of equation $x^2 + 2bx + b = 0$ then sum of all possible values of $b =$
- (1) 1 (2) -1 (3) 2 (4) -2
90. If $g(x)$ is non-negative continuous function such that $g(x) + g\left(x + \frac{1}{2}\right) = 2$ then the value of $\int_0^1 (\sin(8\pi x))g(x) dx =$
- (1) 0 (2) 1 (3) $\frac{1}{2}$ (4) -1

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK



JEE (Main + Advanced) : ENTHUSIAST COURSE

SCORE : II

Test Type : FULL SYLLABUS

Test Pattern : JEE-Main

TEST DATE : 10 - 02 - 2019**PAPER – 2**

Important Instructions

महत्वपूर्ण निर्देश

Do not open this Test Booklet until you are asked to do so.

1. Immediately fill in the form number on this page of the Test Booklet with *Blue/Black Ball Point Pen*. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of **90** questions. The maximum marks are **360**.
5. There are **three** parts in the question paper A,B,C consisting of **Physics, Chemistry** and **Mathematics** having **30 questions** in each part of equal weightage. Each question is allotted 4 (four) marks for **correct** response.
6. **One Fourth** mark will be deducted for indicated incorrect response of each question. **No deduction** from the total score will be made if no response is indicated for an item in the Answer Sheet.
7. Use **Blue/Black Ball Point Pen** only for writing particulars/markings responses on **Side-1** and **Side 2** of the Answer Sheet.
Use of pencil is strictly prohibited.
8. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
9. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
10. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
11. Do not fold or make any stray marks on the Answer Sheet.

इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए।

1. परीक्षा पुस्तिका के इस पृष्ठ पर आवश्यक विवरण *नीले/काले बॉल पाइंट पेन* से तत्काल भरें। *पेन्सिल का प्रयोग बिल्कुल वर्जित है।*
2. परीक्षार्थी अपना फार्म नं. (निर्धारित जगह के अतिरिक्त) परीक्षा पुस्तिका / उत्तर पत्र पर कहीं और न लिखें।
3. परीक्षा की अवधि **3 घंटे** है।
4. इस परीक्षा पुस्तिका में **90** प्रश्न हैं। अधिकतम अंक **360** हैं।
5. इस परीक्षा पुस्तिका में तीन भाग A, B, C हैं, जिसके प्रत्येक भाग में **भौतिक विज्ञान, रसायन विज्ञान एवं गणित** के **30 प्रश्न** हैं और सभी प्रश्नों के अंक समान हैं। प्रत्येक प्रश्न के **सही** उत्तर के लिए 4 (चार) अंक निर्धारित किये गये हैं।
6. प्रत्येक गलत उत्तर के लिए उस प्रश्न के कुल अंक का **एक चौथाई अंक** काटा जायेगा। उत्तर पुस्तिका में कोई भी उत्तर नहीं भरने पर कुल प्राप्तांक में से **ऋणात्मक अंकन** नहीं होगा।
7. उत्तर पत्र के **पृष्ठ-1** एवं **पृष्ठ-2** पर वांछित विवरण एवं उत्तर अंकित करने हेतु केवल *नीले/काले बॉल पाइंट पेन* का ही प्रयोग करें।
पेन्सिल का प्रयोग सर्वथा वर्जित है।
8. परीक्षार्थी द्वारा परीक्षा कक्ष/हॉल में परिचय पत्र के अलावा किसी भी प्रकार की पाठ्य सामग्री मुद्रित या हस्तलिखित कागज की पर्चियों, मोबाइल फोन या किसी भी प्रकार के इलेक्ट्रॉनिक उपकरणों या किसी अन्य प्रकार की सामग्री को ले जाने या उपयोग करने की अनुमति नहीं है।
9. रफ कार्य परीक्षा पुस्तिका में केवल निर्धारित जगह पर ही कीजिये।
10. परीक्षा समाप्त होने पर, परीक्षार्थी कक्ष/हॉल छोड़ने से पूर्व उत्तर पत्र कक्ष निरीक्षक को अवश्य सौंप दें। **परीक्षार्थी अपने साथ इस परीक्षा पुस्तिका को ले जा सकते हैं।**
11. उत्तर पत्र को न मोड़ें एवं न ही उस पर अन्य निशान लगाएँ।

Your Target is to secure Good Rank in JEE (Main) 2019

Corporate Office : **ALLEN** CAREER INSTITUTE, "SANKALP", CP-6, Indra Vihar, Kota (Rajasthan) INDIA 324005

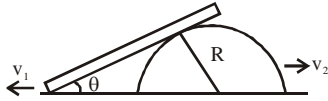
☎ +91-744-2757575 ✉ info@allen.ac.in 🌐 www.allen.ac.in

HAVE CONTROL → HAVE PATIENCE → HAVE CONFIDENCE ⇒ 100% SUCCESS

BEWARE OF NEGATIVE MARKING

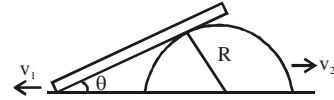
PART A - PHYSICS

1. An object is projected upwards at an angle of 37° with horizontal with velocity 25 m/sec . Then find the position vector (in m) of particle after time 2 sec. ($g = 10 \text{ m/sec}^2$)
- (1) $40\hat{i} + 30\hat{j}$ (2) $40\hat{i} + 10\hat{j}$
- (3) $40\hat{i} - 10\hat{j}$ (4) $10\hat{i} + 40\hat{j}$
2. Figure shows a hemisphere & a supported rod. Hemisphere is moving towards right with a uniform velocity v_2 & the end of the rod which is in contact with ground is moving in left direction with a velocity v_1 . Find the magnitude of rate at which the angle θ is changing in terms of v_1, v_2, R & θ .



- (1) $\frac{(v_1 + v_2) \sin^2 \theta}{R \cos \theta}$ (2) $\frac{(v_1 - v_2) \sin^2 \theta}{R \cos \theta}$
- (3) $\frac{(v_1 + v_2) \cos^2 \theta}{R \sin \theta}$ (4) $\frac{(v_1 - v_2) \cos^2 \theta}{R \sin \theta}$

1. एक वस्तु को 25 m/sec वेग से क्षैतिज के साथ 37° कोण पर ऊपर की ओर प्रक्षेपित किया गया है। तब 2 sec समय के पश्चात् वस्तु का स्थिति सदिश (मीटर में) होगा:- ($g = 10 \text{ m/sec}^2$)
- (1) $40\hat{i} + 30\hat{j}$ (2) $40\hat{i} + 10\hat{j}$
- (3) $40\hat{i} - 10\hat{j}$ (4) $10\hat{i} + 40\hat{j}$
2. दिये गये चित्र में अर्द्धगोले पर एक छड़ रखी हुई है। अर्द्धगोला दाँयी ओर एकसमान वेग v_2 से गतिशील है तथा छड़ का वह सिरा जो धरातल के सम्पर्क में है, बाँयी दिशा में वेग v_1 से गतिशील है। v_1, v_2, R तथा θ के पदों में कोण θ में परिवर्तन की दर का परिमाण ज्ञात कीजिये।



- (1) $\frac{(v_1 + v_2) \sin^2 \theta}{R \cos \theta}$ (2) $\frac{(v_1 - v_2) \sin^2 \theta}{R \cos \theta}$
- (3) $\frac{(v_1 + v_2) \cos^2 \theta}{R \sin \theta}$ (4) $\frac{(v_1 - v_2) \cos^2 \theta}{R \sin \theta}$

कच्चे कार्य के लिए स्थान

3. A neutron moving at a speed v undergoes a head on elastic collision with a mass number A at rest. Find the ratio of kinetic energies of neutron after & before collision.

(1) $\left(\frac{1+A}{1-A}\right)^2$ (2) $\left(\frac{1-A}{1+A}\right)$

(3) $\frac{1+A}{1-A}$ (4) $\left(\frac{1-A}{1+A}\right)^2$

4. Calculate the angle of banking required for a curve of 200 m radius so that a car rounding the curve at 80 kph would have no tendency to skid outward or inward. Assume the surface is friction less.

(1) $\tan^{-1}\left(\frac{40}{81}\right)$ (2) $\tan^{-1}\left(\frac{30}{81}\right)$

(3) $\tan^{-1}\left(\frac{20}{81}\right)$ (4) $\tan^{-1}\left(\frac{1}{4}\right)$

5. Which of the following forces is not conservative?

(1) $\vec{F} = 3\hat{i} + 4\hat{j}$ (2) $\vec{F} = 3x\hat{i} + 4y\hat{j}$

(3) $\vec{F} = 3y\hat{i} + 4x\hat{j}$ (4) $\vec{F} = 3x^2\hat{i} + 4y^2\hat{j}$

3. एक न्यूट्रॉन v चाल से गति करता हुआ विराम में स्थित द्रव्यमान संख्या A के साथ सम्मुख प्रत्यास्थ टक्कर करता है। टक्कर के बाद तथा टक्कर के पहले न्यूट्रॉन की गतिज ऊर्जाओं का अनुपात ज्ञात कीजिये।

(1) $\left(\frac{1+A}{1-A}\right)^2$ (2) $\left(\frac{1-A}{1+A}\right)$

(3) $\frac{1+A}{1-A}$ (4) $\left(\frac{1-A}{1+A}\right)^2$

4. त्रिज्या 200 m वाली वक्रीय सड़क का आवश्यक बंकन कोण ज्ञात कीजिये ताकि एक कार जो इस वक्र पर 80 kph की चाल से चल रही है, वह न तो भीतर फिसले ना बाहर की ओर माना सतह घर्षणरहित है।

(1) $\tan^{-1}\left(\frac{40}{81}\right)$ (2) $\tan^{-1}\left(\frac{30}{81}\right)$

(3) $\tan^{-1}\left(\frac{20}{81}\right)$ (4) $\tan^{-1}\left(\frac{1}{4}\right)$

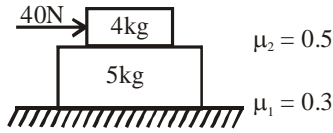
5. निम्न में से कौनसा बल संरक्षी नहीं है ?

(1) $\vec{F} = 3\hat{i} + 4\hat{j}$ (2) $\vec{F} = 3x\hat{i} + 4y\hat{j}$

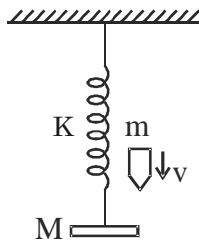
(3) $\vec{F} = 3y\hat{i} + 4x\hat{j}$ (4) $\vec{F} = 3x^2\hat{i} + 4y^2\hat{j}$

कच्चे कार्य के लिए स्थान

6. Find the acceleration of the two blocks of 4 kg & 5 kg mass if a force of 40 N is applied on 4 kg block. Friction coefficient between respective surfaces are shown in fig.

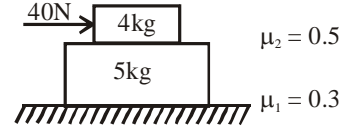


- (1) 5 m/sec^2 , 5 m/sec^2
 (2) 5 m/sec^2 , 2 m/sec^2
 (3) 2 m/sec^2 , 5 m/sec^2
 (4) 5 m/sec^2 , 0 m/sec
7. For the given system initially at rest as shown in figure, a bullet strikes the block inelastically and sticks to it then the amplitude of the system will be – (Neglect the thickness of the block)

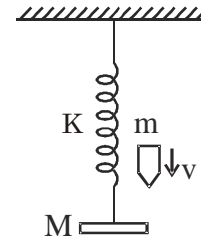


- (1) $\frac{m}{k} \sqrt{\frac{v_0^2}{M+m} + g^2}$ (2) $\frac{m}{k} \sqrt{\frac{v_0^2 k}{M+m} + g^2}$
 (3) $\frac{2m}{k} \sqrt{\frac{v_0^2}{M+m} + g^2}$ (4) $\frac{m}{2k} \sqrt{\frac{v_0^2 k}{M+m} + g^2}$

6. प्रदर्शित चित्र में 4 kg तथा 5 kg द्रव्यमान वाले दो ब्लॉकों के त्वरण ज्ञात कीजिये यदि 4 kg ब्लॉक पर 40 N का बल लग रहा हो। संगत सतहों के मध्य घर्षण गुणांक चित्र में दर्शाये गये हैं।



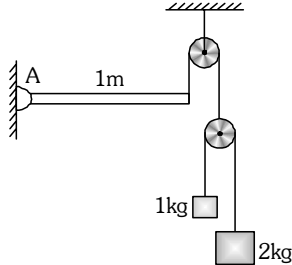
- (1) 5 m/sec^2 , 5 m/sec^2
 (2) 5 m/sec^2 , 2 m/sec^2
 (3) 2 m/sec^2 , 5 m/sec^2
 (4) 5 m/sec^2 , 0 m/sec
7. प्रारम्भ में विराम में स्थित प्रदर्शित तंत्र में यदि गोली ब्लॉक से अप्रत्यास्थ टक्कर करती है तथा इससे चिपक जाती है तब तंत्र का आयाम होगा- (ब्लॉक की मोटाई नगण्य मानें)



- (1) $\frac{m}{k} \sqrt{\frac{v_0^2}{M+m} + g^2}$ (2) $\frac{m}{k} \sqrt{\frac{v_0^2 k}{M+m} + g^2}$
 (3) $\frac{2m}{k} \sqrt{\frac{v_0^2}{M+m} + g^2}$ (4) $\frac{m}{2k} \sqrt{\frac{v_0^2 k}{M+m} + g^2}$

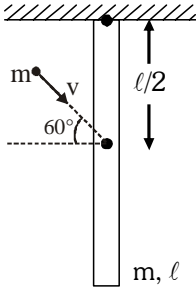
कच्चे कार्य के लिए स्थान

8. Consider the situation shown in the figure. Uniform rod of length $L = 1\text{m}$ can rotate freely about the hinge A in vertical plane. Pulleys and strings are light and frictionless. If the rod remains horizontal at rest during the motion of masses, then the mass of the rod is



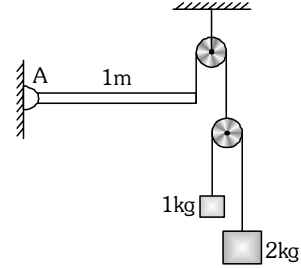
- (1) $\frac{4}{3}\text{ kg}$ (2) $\frac{16}{3}\text{ kg}$ (3) $\frac{8}{3}\text{ kg}$ (4) $\frac{32}{3}\text{ kg}$

9. A thin rod of mass m and length ℓ is hinged to a ceiling and it is free to rotate in a vertical plane. A particle of mass m , moving with speed v strikes it as shown in the figure and gets stick with the rod. The value of v , for which the rod becomes horizontal after collision is (given $\ell = 3m$, $m = 1\text{kg}$ & $g = 10\text{ m/s}^2$)



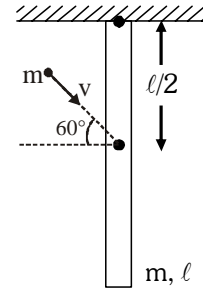
- (1) $4\sqrt{17}\text{m/s}$ (2) $2\sqrt{17}\text{m/s}$
(3) $4\sqrt{35}\text{m/s}$ (4) $2\sqrt{35}\text{m/s}$

8. दिये गये तंत्र में, $L = 1\text{m}$ लम्बाई की एकसमान छड़ कीलक A के परितः ऊर्ध्वाधर तल में स्वतंत्र रूप से घूर्णन गति कर सकती है। रस्सियाँ तथा धिरनियाँ हल्की तथा घर्षणरहित हैं। द्रव्यमानों की गति के दौरान यदि छड़ विरामावस्था में क्षैतिज बनी रहती है तब छड़ का द्रव्यमान होगा-



- (1) $\frac{4}{3}\text{ kg}$ (2) $\frac{16}{3}\text{ kg}$ (3) $\frac{8}{3}\text{ kg}$ (4) $\frac{32}{3}\text{ kg}$

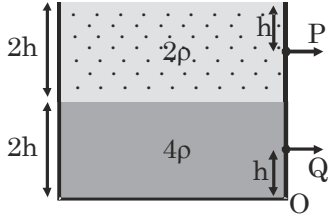
9. एक m द्रव्यमान तथा ℓ लम्बाई की पतली छड़ को चित्रानुसार छत से कीलकीत किया गया है तथा यह ऊर्ध्वाधर तल में घूर्णन के लिए स्वतंत्र है। चित्रानुसार एक m द्रव्यमान का कण v चाल से गतिशील होकर इससे टकराता है तथा छड़ से चिपक जाता है। v का मान ज्ञात कीजिए यदि छड़ टक्कर के पश्चात् क्षैतिज हो जाती है। (दिया गया है: $\ell = 3m$, $m = 1\text{kg}$ तथा $g = 10\text{ m/s}^2$)



- (1) $4\sqrt{17}\text{m/s}$ (2) $2\sqrt{17}\text{m/s}$
(3) $4\sqrt{35}\text{m/s}$ (4) $2\sqrt{35}\text{m/s}$

कच्चे कार्य के लिए स्थान

10. A large tank is filled with two liquids of specific gravities 2ρ and 4ρ . Two holes are made on the wall of the tank as shown. Find the ratio of the distance from O of the points on the ground where the jets from holes P & Q strike.



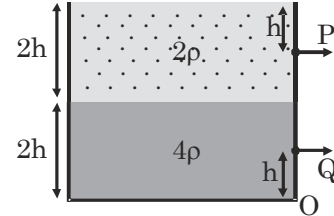
- (1) $\sqrt{3} : \sqrt{4}$ (2) $\sqrt{3} : \sqrt{2}$
(3) $\sqrt{3} : 2$ (4) None of these

11. The displacement of a particle varies with time as $x = (15 \sin \omega t - 20 \sin^3 \omega t)$ cm.
(a) Its motion is SHM
(b) Its motion is not SHM
(c) Maximum acceleration is $45\omega^2$
(d) Time period of its motion is $(2\pi/\omega)$

Choose the correct option :

- (1) (a) & (c) (2) (b) & (d)
(3) (a), (c) & (d) (4) (b), (c) & (d)

10. एक बड़ी टंकी को 2ρ और 4ρ विशिष्ट गुरुत्वों वाले दो द्रवों से भरा गया है। चित्रानुसार टंकी की दीवार पर दो छिद्र बनाये जाते हैं। O से धरातल पर स्थित उन बिन्दुओं के बीच की दूरियों का अनुपात ज्ञात कीजिए जहाँ छिद्र P तथा Q से निकलने वाली द्रव की धारा टकराती है।



- (1) $\sqrt{3} : \sqrt{4}$ (2) $\sqrt{3} : \sqrt{2}$
(3) $\sqrt{3} : 2$ (4) इनमें से कोई नहीं

11. एक कण का विस्थापन समय के साथ $x = (15 \sin \omega t - 20 \sin^3 \omega t)$ cm के अनुसार परिवर्तित होता है।

- (a) इसकी गति, सरल आवर्त गति होगी।
(b) इसकी गति, सरल आवर्त गति नहीं होगी।
(c) अधिकतम त्वरण $45\omega^2$ है।
(d) इसकी गति का आवर्त काल $(2\pi/\omega)$ है।

सही विकल्प चुनिये :

- (1) (a) & (c) (2) (b) & (d)
(3) (a), (c) & (d) (4) (b), (c) & (d)

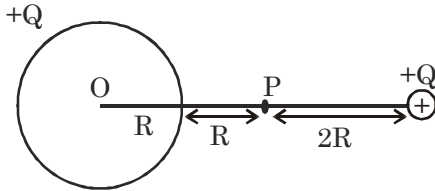
कच्चे कार्य के लिए स्थान

12. Two capillary tubes of same diameter are put vertically one each in two liquids whose relative densities are 0.4 and 0.3 and surface tensions are 50 dyne/cm and 25 dyne/cm respectively. Ratio of heights of liquids in the two tubes $\frac{h_1}{h_2}$ is :-

(Take angle at contact = 0°)

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

13. A metal sphere is given charge +Q as shown in the figure. A point charge +Q is placed at a distance 4R from the centre of the sphere choose correct statement(s).



Metal sphere

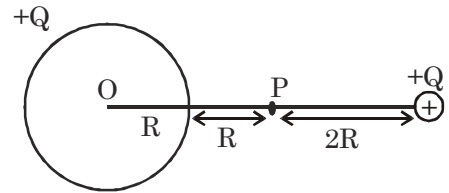
- (i) Net electric field at point P is zero
 (ii) In absence of point charge field at O is non zero.
 (iii) In presence of point charge field at P is towards metal sphere
 (iv) In presence of point charge field at O is zero
- (1) i, iii, iv are correct
 (2) i, ii are correct
 (3) ii, iii are correct
 (4) iii, iv are correct

12. समान व्यास की दो केशनलियाँ प्रत्येक दो द्रवों, जिनके सापेक्षिक घनत्व क्रमशः 0.4 एवं 0.3 तथा पृष्ठ तनाव क्रमशः 50 डाइन/सेमी एवं 25 डाइन/सेमी है, में ऊर्ध्वाधर रूप से रखी जाती है। दोनों केशनलियों में द्रवों की ऊँचाइयों का अनुपात $\frac{h_1}{h_2}$ है :-

(सम्पर्क कोण शून्य लीजिए)

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

13. एक धातु के गोले को +Q आवेश दिया गया है, चित्र देखें। एक बिन्दु आवेश +Q गोले के केन्द्र से 4R दूरी पर रखा गया है। सही कथन/कथनों को चुनिये।

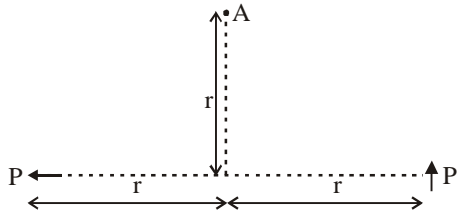


Metal sphere

- (i) बिन्दु P पर कुल विद्युत क्षेत्र का मान शून्य होगा।
 (ii) बिन्दु आवेश की अनुपस्थिति में बिन्दु O पर क्षेत्र का मान अशून्य होगा।
 (iii) बिन्दु आवेश की उपस्थिति में P बिन्दु पर क्षेत्र की दिशा धात्विक गोले की ओर होगी।
 (iv) बिन्दु आवेश की उपस्थिति में O बिन्दु पर क्षेत्र शून्य होगा।
- (1) i, iii, iv कथन सही है।
 (2) i, ii कथन सही है।
 (3) ii, iii कथन सही है।
 (4) iii, iv कथन सही है।

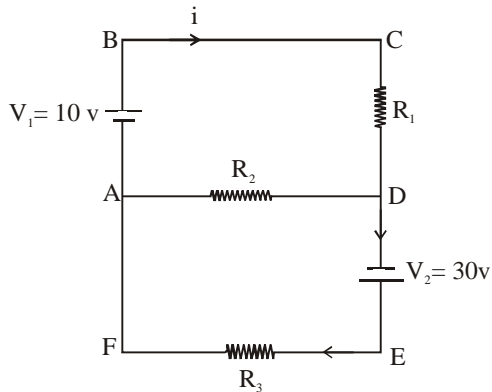
कच्चे कार्य के लिए स्थान

14. P is the dipole moment of two small dipoles shown in the figure. What is the potential at point A?



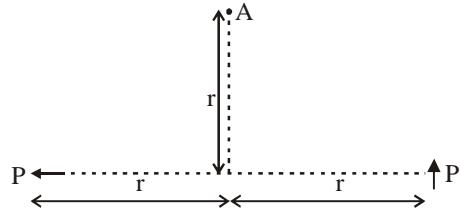
- (1) 0 (2) $\frac{Kp}{\sqrt{2}r^2}$ (3) $\sqrt{2}\frac{Kp}{r^2}$ (4) $2\frac{Kp}{r^2}$

15. Two ideal batteries of emf V_1 and V_2 and three resistances R_1 , R_2 and R_3 are connected as shown in the below figure. The current in resistance R_2 is zero. If colour code of R_1 is red, green, yellow then colour code of R_3 will be.



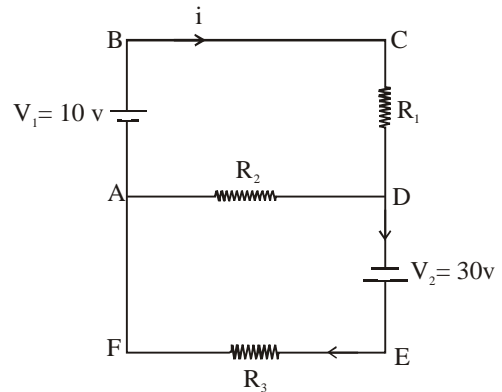
- (1) Gray, Red, Violet
(2) Red, Green, Yellow
(3) Violet, Green, Yellow
(4) Green, Violet, Yellow

14. चित्र में दर्शाये दो छोटे द्विध्रुवों का द्विध्रुव आघूर्ण P है। बिन्दु A पर विभव का मान क्या होगा ?



- (1) 0 (2) $\frac{Kp}{\sqrt{2}r^2}$ (3) $\sqrt{2}\frac{Kp}{r^2}$ (4) $2\frac{Kp}{r^2}$

15. विद्युत वाहक बल V_1 तथा V_2 वाली दो आदर्श बैटरियों तथा तीन प्रतिरोधों R_1 , R_2 व R_3 को चित्रानुसार जोड़ा गया है। प्रतिरोध R_2 में धारा का मान शून्य है। यदि R_1 का वर्णक्रम लाल, हरा, पीला हो तो R_3 का वर्णक्रम होगा :-

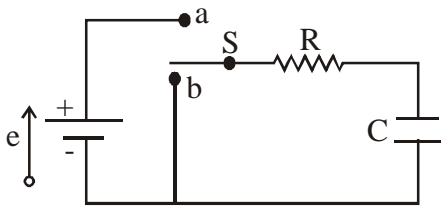


- (1) स्लेटी, लाल, बैंगनी
(2) लाल, हरा, पीला
(3) बैंगनी, हरा, पीला
(4) हरा, बैंगनी, पीला

कच्चे कार्य के लिए स्थान

16. The table gives four sets of values for the circuit elements in figure. Rank the sets according to (as the switch is closed on point 'a' initially for long time) the time required for the current to decrease to half of its initial value, when switch is shifted at b, greatest first. Take time t_1 , t_2 , t_3 and t_4 respectively for four sets 1, 2, 3 & 4

	1	2	3	4
emf(V)	12	12	10	10
R(Ω)	2	3	10	5
C(μ F)	3	2	0.5	2



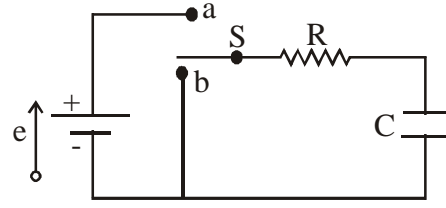
- (1) $t_4 > t_2 > t_1 > t_3$ (2) $t_4 > t_1 = t_2 > t_3$
 (3) $t_3 > t_2 > t_1 > t_4$ (4) $t_3 > t_2 = t_1 > t_4$

17. Choose the correct statement

- (1) In most of northern hemisphere the northpole of the dip needle tilt upwards
- (2) In most of northern hemisphere the northpole of the dip needle tilt downwards
- (3) In most of southern hemisphere the northpole of the dip needle tilt downwards
- (4) At equator the northpole of the dip needle tilts downwards.

16. प्रदर्शित टेबल में चित्र में दिए गये परिपथ अवयवों के मानों के चार सेट दिये गये हैं। यदि स्विच को प्रारम्भ में लम्बे समय के लिए a पर बंद रखा गया है तथा जब स्विच को b पर विस्थापित किया जाता है तो धारा के मान को इसके प्रारम्भिक मान के आधे तक घटने के लिए आवश्यक समय के आधार पर इन सेटों को व्यवस्थित कीजिये। चारों सेटों 1, 2, 3 तथा 4 में लगा समय क्रमशः t_1 , t_2 , t_3 तथा t_4 है।

	1	2	3	4
emf(V)	12	12	10	10
R(Ω)	2	3	10	5
C(μ F)	3	2	0.5	2



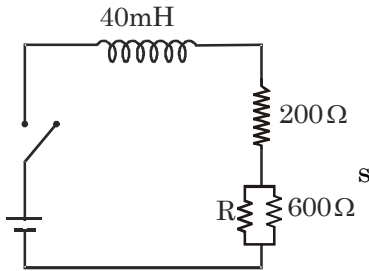
- (1) $t_4 > t_2 > t_1 > t_3$ (2) $t_4 > t_1 = t_2 > t_3$
 (3) $t_3 > t_2 > t_1 > t_4$ (4) $t_3 > t_2 = t_1 > t_4$

17. सही विकल्प चुने -

- (1) उत्तरी गोलार्द्ध के अधिकांश भाग में नति सूई का उत्तरी ध्रुव ऊपर की ओर मुड़ा होता है।
- (2) उत्तरी गोलार्द्ध के अधिकांश भाग में नति सूई का उत्तरी ध्रुव नीचे की ओर मुड़ा होता है।
- (3) दक्षिणी गोलार्द्ध के अधिकांश भाग में नति सूई का उत्तरी ध्रुव नीचे की ओर मुड़ा होता है।
- (4) भूमध्य रेखा पर नति सूई का उत्तरी ध्रुव नीचे की ओर मुड़ा होता है।

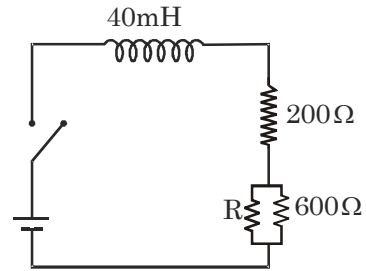
कच्चे कार्य के लिए स्थान

18. A domain in ferromagnetic iron is in the form of a cube of side length $1 \mu\text{m}$. The molecular mass of iron is 56 g/mole and its density is 8 g/cm^3 . Assume that each iron atom has a dipole moment of $9.1 \times 10^{-23} \text{ Am}^2$. Take Avogadro number 6×10^{23} .
- (i) Number of atoms in domain = 8.2×10^{12}
(ii) Maximum possible dipole moment of the domain = $7.8 \times 10^{-12} \text{ Am}^2$
(iii) Maximum magnetisation of domain is = $7.8 \times 10^6 \text{ A/m}$.
- (1) all are correct
(2) only (i) & (ii) are correct
(3) only (ii) & (iii) are correct
(4) only (i) & (iii) are correct
19. When switch S is closed, then for what value of R will the time constant will be $100 \mu\text{s}$.



- (1) 400Ω (2) 300Ω
(3) 200Ω (4) 100Ω

18. लौह चुंबकीय पदार्थ लोहे में कोई डोमेन $1 \mu\text{m}$ भुजा लम्बाई वाले घन के रूप में है। लोहे का आण्विक द्रव्यमान 56 g/mole और इसका घनत्व 8 g/cm^3 होता है। माना प्रत्येक लौह परमाणु का द्विध्रुव आघूर्ण $9.1 \times 10^{-23} \text{ Am}^2$ है। आवोगाद्रो संख्या 6×10^{23} लीजिये।
- (i) डोमेन में परमाणुओं की संख्या = 8.2×10^{12}
(ii) डोमेन का अधिकतम संभावित द्विध्रुव आघूर्ण = $7.8 \times 10^{-12} \text{ Am}^2$
(iii) डोमेन का अधिकतम चुंबकन = $7.8 \times 10^6 \text{ A/m}$.
- (1) सभी विकल्प सही है।
(2) केवल (i) & (ii) सही है।
(3) केवल (ii) & (iii) सही है।
(4) केवल (i) & (iii) सही है।
19. प्रदर्शित चित्र में जब स्विच S को बंद किया जाता है तब R के किस मान के लिए समय नियतांक $100 \mu\text{s}$ होगा ?



- (1) 400Ω (2) 300Ω
(3) 200Ω (4) 100Ω

कच्चे कार्य के लिए स्थान

20. In an AC circuit, $C = \frac{25}{\pi} \mu\text{F}$ and $R = 300\Omega$ are connected in series with AC source of 200V and 50 sec^{-1} frequency. The power dissipated and power factor in circuit will be :
- (1) 48 W, 0.4 (2) 24 W, 0.6
 (3) 48 W, 0.6 (4) 24 W, 0.4
21. In an LC oscillator, $L = 12 \text{ mH}$ & $C = 1.6 \mu\text{F}$ and $R = 1.5 \Omega$. Find the time in which max charge on capacitor falls to half of its initial value (approximately)
- (1) 5 ms (2) 11 ms
 (3) 17 ms (4) 23 ms
22. Which statement regarding work function (ϕ) is correct?
- (1) Work function depends on intensity of incident radiation
 (2) Work function depends on frequency of incident radiation
 (3) Work function depends on area of metal surface
 (4) Work function depends on the surface of the metal.
20. एक AC परिपथ में, $C = \frac{25}{\pi} \mu\text{F}$ तथा $R = 300\Omega$ श्रेणी क्रम में 200V तथा 50 sec^{-1} आवृत्ति वाले AC स्रोत के साथ जोड़े जाते हैं। परिपथ में शक्ति व्यय तथा शक्ति गुणांक के मान होंगे
- (1) 48 W, 0.4 (2) 24 W, 0.6
 (3) 48 W, 0.6 (4) 24 W, 0.4
21. एक LC दोलित्र में, $L = 12 \text{ mH}$, $C = 1.6 \mu\text{F}$ तथा $R = 1.5 \Omega$ है। वह समय ज्ञात कीजिये जब संधारित्र पर अधिकतम आवेश, इसके प्रारम्भिक मान का आधा हो जाता है (लगभग) :-
- (1) 5 ms (2) 11 ms
 (3) 17 ms (4) 23 ms
22. कार्य फलन (ϕ) के लिये सही कथन चुने।
- (1) कार्य फलन आपतित विकिरण की तीव्रता पर निर्भर करता है।
 (2) कार्य फलन आपतित विकिरण की आवृत्ति पर निर्भर करता है।
 (3) कार्य फलन धात्विक सतह के क्षेत्रफल पर निर्भर करता है।
 (4) कार्य फलन धात्विक सतह पर निर्भर करता है।

कच्चे कार्य के लिए स्थान

- | | |
|--|--|
| <p>23. Suppose the energy of k_{α} x-rays of two elements P & Q are 826.2 eV and 2947.8 eV then the number of elements lying between P & Q according to their atomic number is
 (1) 5 (2) 6 (3) 7 (4) 8</p> <p>24. Angular magnification for an astronomical telescope is 5 and the tube length for image at infinity is 36cm. Then find tube length for image formed at least distance of distinct vision for normal eye (25 cm)
 (1) 36.4 cm (2) 34.8 cm
 (3) 30.2 cm (4) 38 cm</p> <p>25. A light of wavelength 5000 Å falls on a glass slab of refractive index 1.5 making angle of refraction 60°. The width of slab so as the reflected rays appear dark is
 (1) 10^{-8} m (2) 4×10^{-7} m
 (3) $\frac{10}{3} \times 10^{-7}$ m (4) 6×10^{-7} m</p> <p>26. A parallel beam of monochromatic light of wavelength 450 nm passes through a long slit of width 0.2 mm. Find the angular divergence in which most of the light is diffracted :-
 (1) 4.5×10^{-3} rad (2) 2×10^{-3} rad
 (3) 3×10^{-3} rad (4) 2.25×10^{-3} rad</p> | <p>23. माना दो तत्वों P तथा Q की k_{α} x-किरणों की ऊर्जा 826.2 eV तथा 2947.8 eV है, तब P तथा Q के मध्य परमाणु संख्या के आधार पर उपस्थित तत्वों की संख्या होगी :-
 (1) 5 (2) 6 (3) 7 (4) 8</p> <p>24. एक खगोलीय दूरदर्शी का कोणीय आवर्धन 5 है तथा अनन्त पर प्रतिबिंब के लिए नली की लम्बाई 36cm है। तब एक सामान्य आँख के लिए स्पष्ट दृष्टि की न्यूनतम दूरी (25 cm) पर प्रतिबिंब निर्माण के लिए नली की लम्बाई ज्ञात करें।
 (1) 36.4 cm (2) 34.8 cm
 (3) 30.2 cm (4) 38 cm</p> <p>25. तरंगदैर्घ्य 5000 Å का प्रकाश एक काँच की पट्टिका जिसका अपवर्तनांक 1.5 है, पर 60° का अपवर्तन कोण बनाते हुए आपतित होता है। पट्टिका की मोटाई ज्ञात कीजिये ताकि परावर्तित किरणें काली प्रतीत हो।
 (1) 10^{-8} m (2) 4×10^{-7} m
 (3) $\frac{10}{3} \times 10^{-7}$ m (4) 6×10^{-7} m</p> <p>26. तरंगदैर्घ्य 450 nm वाला एकवर्णीय प्रकाश का समान्तर पुंज 0.2 mm चौड़ाई वाली एक लम्बी स्लिट से होकर गुजरता है। वह कोणीय अपसरण ज्ञात कीजिये जिसमें अधिकतम प्रकाश विवर्तित होता है?
 (1) 4.5×10^{-3} rad (2) 2×10^{-3} rad
 (3) 3×10^{-3} rad (4) 2.25×10^{-3} rad</p> |
|--|--|

कच्चे कार्य के लिए स्थान

- | | |
|---|---|
| <p>27. The value of one division of a vernier scale in a device is $(0.4)^\circ$ and 20 divisions of main scale are equal to 25 divisions of vernier. Then leastcount of device is :</p> <p>(1) $(0.5)^\circ$ (2) $(0.4)^\circ$
 (3) $(0.2)^\circ$ (4) $(0.1)^\circ$</p> <p>28. Which of the following band gap semiconductor is suitable for LED?</p> <p>(1) 1.2 eV
 (2) 2 eV
 (3) 4 eV
 (4) Any of the above</p> <p>29. Transistors are :</p> <p>(1) Current controlling devices
 (2) Voltage controlling device
 (3) Resistance controlled device
 (4) none of these</p> <p>30. In an amplitude modulated wave for audio-frequency of 500 Hz, the appropriate carrier wave frequency will be :-</p> <p>(1) 50 Hz
 (2) 100 Hz
 (3) 500 Hz
 (4) 50,000 Hz</p> | <p>27. किसी युक्ति में वर्नियर स्केल के एक भाग का मान $(0.4)^\circ$ है और मुख्य स्केल के 20 भाग वर्नियर के 25 भागों के तुल्य है, तब युक्ति का अल्पतमांक होगा :</p> <p>(1) $(0.5)^\circ$ (2) $(0.4)^\circ$
 (3) $(0.2)^\circ$ (4) $(0.1)^\circ$</p> <p>28. निम्न में से कौन सा बैंड अंतराल अर्द्धचालक LED के लिए उपयुक्त है?</p> <p>(1) 1.2 eV
 (2) 2 eV
 (3) 4 eV
 (4) उपरोक्त में से कोई भी</p> <p>29. ट्रांजिस्टर होते हैं :</p> <p>(1) धारा नियंत्रण यंत्र
 (2) वोल्टता नियंत्रण यंत्र
 (3) प्रतिरोध नियंत्रित यंत्र
 (4) उपरोक्त में से कोई नहीं</p> <p>30. किसी आयाम मोडूलित तरंग में 500 Hz श्रव्य आवृत्ति के लिए उचित वाहक तरंग आवृत्ति होगी :-</p> <p>(1) 50 Hz
 (2) 100 Hz
 (3) 500 Hz
 (4) 50,000 Hz</p> |
|---|---|

कच्चे कार्य के लिए स्थान

PART B - CHEMISTRY

31. One mole of gas 'A' and 2 moles of SO_2 are placed in a container, gaseous mixture effusing out initially from a pinhole made in container has ratio of A & SO_2 in 1 : 1 mole ratio. The gas 'A' can be :
- (1) H_2 (2) CH_4
(3) He (4) D_2
32. $\text{SO}_2(g) + \text{Cl}_2(g) \rightleftharpoons \text{SO}_2\text{Cl}_2(g)$
- Backward reaction is endothermic. If some quantity of Cl_2 is added keeping volume of container constant which of the following statement is correct.
- (1) No effect on instantaneous pressure of container
(2) Temp of container will increase
(3) Temp of container will decrease
(4) No effect on temperature of container
33. If uncertainty in position of electron is equal to half of its de Broglie wave length. The minimum percentage error in its measurement of velocity under this condition, will be approximately
- (1) 4%
(2) 8%
(3) 16%
(4) 32%
31. एक मोल गैस 'A' तथा 2 मोल SO_2 गैस को एक पात्र में रखा गया है। पात्र के सूक्ष्म छिद्र द्वारा गैसीय मिश्रण निःसरित होता है तथा बाहर निकलने वाले गैसीय मिश्रण में गैस A तथा SO_2 का मोलर अनुपात 1 : 1 है। गैस 'A' हो सकती है-
- (1) H_2 (2) CH_4
(3) He (4) D_2
32. $\text{SO}_2(g) + \text{Cl}_2(g) \rightleftharpoons \text{SO}_2\text{Cl}_2(g)$
- इसकी पश्च अभिक्रिया ऊष्माशोषी है। यदि पात्र का आयतन स्थिर रखते हुए इसमें कुछ मात्रा में Cl_2 गैस मिलाई जाती है तो निम्न में से कौन सा कथन सत्य है-
- (1) पात्र के तात्क्षणिक दाब पर कोई प्रभाव नहीं पड़ेगा।
(2) पात्र का ताप बढ़ेगा
(3) पात्र का ताप घटेगा
(4) पात्र के ताप पर कोई प्रभाव नहीं पड़ेगा
33. यदि इलेक्ट्रॉन की स्थिति में अनिश्चितता उसकी डी ब्रोग्ली तरंगदैर्घ्य के आधी है तो इन परिस्थितियों में उसके वेग के मापन में न्यूनतम त्रुटि का प्रतिशत लगभग होगा।
- (1) 4%
(2) 8%
(3) 16%
(4) 32%

कच्चे कार्य के लिए स्थान

34. Assuming that bond enthalpy of axial P-Cl bond is different from bond enthalpy of equatorial P-Cl bond, bond enthalpy of axial P-Cl bond in PCl_5 will be :

$$(\text{given } \Delta H_f PCl_3(g) = -320 \text{ KJ/mol})$$

$$\Delta H_f P_{(g)} = 315 \text{ KJ/mol}$$

$$\Delta H_f PCl_{5(g)} = -400 \text{ KJ/mol}$$

$$\Delta H_{\text{atomization}} Cl_2 = 240 \text{ KJ/mol}$$

& bonds of PCl_3 are same as equatorial bonds of PCl_5

(1) 331.67 KJ/mol

(2) 160 KJ/mol

(3) 90 KJ/mol

(4) 40 KJ/mol

35. On doubling the temperature of reaction from initial temperature of 200 K, fraction of activated molecule become \sqrt{e} times of its initial value, activation energy of reaction is (in calories) -

$$[\text{Given } R \approx 2 \text{ cal } k^{-1} - \text{mol}^{-1}]$$

(1) 200 cal

(2) 400 cal

(3) 800 cal

(4) 100 cal

34. यह मानते हुए कि PCl_5 में अक्षीय तथा विषुवतीय P-Cl बंध की बंधएन्थैल्पी का मान अलग अलग है, निम्न आँकड़ों की सहायता से अक्षीय P-Cl बंध की बंध एन्थैल्पी का मान होगा:

$$(\text{दिया है } \Delta H_f PCl_3(g) = -320 \text{ KJ/mol})$$

$$\Delta H_f P_{(g)} = 315 \text{ KJ/mol}$$

$$\Delta H_f PCl_{5(g)} = -400 \text{ KJ/mol}$$

$$\Delta H_{\text{परमाण्विककरण}} Cl_2 = 240 \text{ KJ/mol}$$

PCl_3 के बंध PCl_5 के विषुवतीय बंधों के समान है।

(1) 331.67 KJ/mol (2) 160 KJ/mol

(3) 90 KJ/mol (4) 40 KJ/mol

35. किसी अभिक्रिया के प्रारंभिक ताप 200 K को दुगना करने पर सक्रिय अणुओं का प्रभाज अपने प्रारंभिक मान का \sqrt{e} गुना हो जाता है। अभिक्रिया की सक्रियण ऊर्जा का मान होगा (केलोरी इकाई में)

$$[\text{दिया है } R \approx 2 \text{ cal } k^{-1} - \text{mol}^{-1}]$$

(1) 200 cal

(2) 400 cal

(3) 800 cal

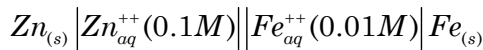
(4) 100 cal

कच्चे कार्य के लिए स्थान

36. Aqueous solution of NaCl is electrolysed by using a variable current source where current as expressed as $i = (2+t)$. If electrolysis is carried out for 20 second then select correct statement-
 (i = current in ampere and t = time in seconds)
- (1) Number of moles of H_2 released at cathode is $\frac{12}{9650}$
 - (2) Number of moles of Cl_2 liberated at anode is $\frac{24}{9650}$
 - (3) Number of moles of Cl_2 liberated at cathode is $\frac{12}{9650}$
 - (4) Number of moles H_2 released at anode is $\frac{24}{9650}$
37. Choose the correct statement among the following-
- (1) Enthalpy of formation of a compound always have positive value.
 - (2) Standard enthalpy of formation of $OH^-_{(aq)} = 0$
 - (3) Enthalpy of formation of carbon mono oxide gas at 300 K is -110 kcal/mol then internal energy change for same process will be -109.7 kcal/mol
 - (4) Standard enthalpy of formation of $H^+_{aq} = 0$
36. NaCl के जलीय विलयन को परिवर्तनीय विद्युत धारा स्रोत की सहायता से 20 सेकण्ड तक विद्युत अपघटन किया गया जहाँ विद्युत धारा का मान $i = (2+t)$ दिया गया है। निम्नलिखित में से सत्य कथन चुनिये-
 (i = ऐम्पीयर में धारा तथा t = समय सेकंड में)
- (1) कैथोड पर मुक्त H_2 के मोलों की संख्या $\frac{12}{9650}$ है।
 - (2) एनोड पर मुक्त Cl_2 के मोलों की संख्या $\frac{24}{9650}$ है।
 - (3) कैथोड पर मुक्त Cl_2 के मोलों की संख्या $\frac{12}{9650}$ है।
 - (4) एनोड पर मुक्त H_2 के मोलों की संख्या $\frac{24}{9650}$ है।
37. निम्नलिखित में से सत्य कथन चुनिये-
- (1) किसी यौगिक के निर्माण की एन्थैल्पी सदैव धनात्मक होती है।
 - (2) $OH^-_{(aq)}$ की मानक संभवन ऊष्मा का मान शून्य होता है
 - (3) 300 K ताप पर $CO_{(g)}$ की संभवन एन्थैल्पी का मान -110 किलो कैलोरी प्रति मोल हो तो इसी प्रक्रम के लिए आन्तरिक ऊर्जा में परिवर्तन का मान -109.7 किलो कैलोरी प्रति मोल होगा
 - (4) H^+_{aq} की मानक संभवन एन्थैल्पी का मान शून्य होता है।

कच्चे कार्य के लिए स्थान

38. Emf of given cell



is 0.3 volt. The value of equilibrium constant of cell reaction will be—

(Take $\frac{2.303RT}{F} = 0.06$)

- (1) 10^{11} (2) 10^{-11} (3) $10^{-5.5}$ (4) $10^{5.5}$

39. What will be the total number of ammonia molecules required to completely cover surface area of 20 gm charcoal by monolayer formation. Given that 1 gm charcoal has surface area $10^3 m^2$ and radius of ammonia molecule is r nm.

(Given that : ammonia molecules form hexagonal close packing in two dimension)

(1) $\frac{2 \times 10^{22}}{\pi r^2}$

(2) $\frac{10^{22}}{\sqrt{3}r^2}$

(3) $\frac{2 \times 10^3}{\pi r^2}$

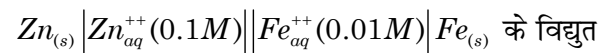
(4) $\frac{4 \times 10^{18}}{\pi r^2}$

40. 100 mL, 0.1 M CH_3COONH_4 solution has pH x_1 . Now by keeping temperature constant 400mL of water was added to solution and on calculation pH was found to be x_2 . The ratio of x_1 to x_2 will be —

(given $Pka_{(NH_4^+)} = 9.3$, $Pka_{(CH_3COOH)} = 4.7$)

- (1) 1 (2) 7/5 (3) 12/7 (4) 2/3

38. दिये गए सेल



के विद्युत वाहक बल का मान 0.3 वोल्ट है।

इस सेल अभिक्रिया के साम्य स्थिरांक का मान होगा —

(दिया है $\frac{2.303RT}{F} = 0.06$)

- (1) 10^{11} (2) 10^{-11} (3) $10^{-5.5}$ (4) $10^{5.5}$

39. 20 gm चारकोल के पृष्ठ क्षेत्रफल को अमोनिया अणुओं की एकल आण्विक परत द्वारा पूर्णतः आच्छादित करने के लिए अमोनिया के अणुओं की वांछित संख्या क्या होगी ?

दिया गया है कि 1 gm चारकोल का पृष्ठ क्षेत्रफल $10^3 m^2$ है तथा अमोनिया अणु की त्रिज्या r nm है

(दिया गया है : अमोनिया के अणु द्विविमीय षट्भुजीय बंद संकुलन बना रहे हैं)

(1) $\frac{2 \times 10^{22}}{\pi r^2}$

(2) $\frac{10^{22}}{\sqrt{3}r^2}$

(3) $\frac{2 \times 10^3}{\pi r^2}$

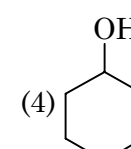
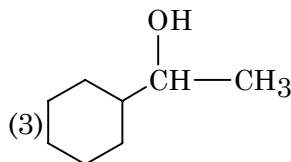
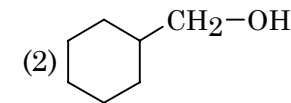
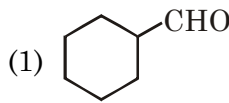
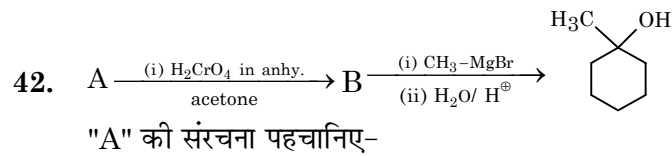
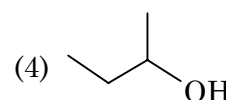
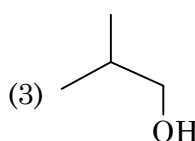
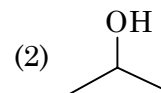
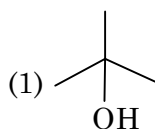
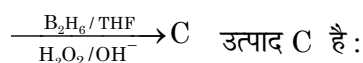
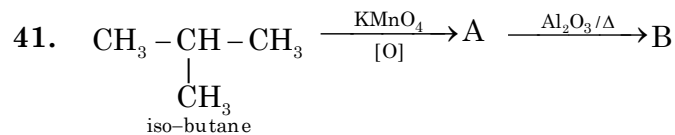
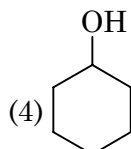
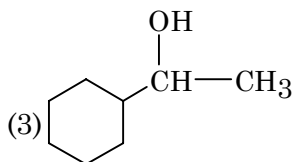
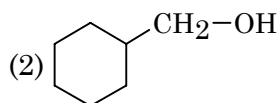
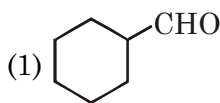
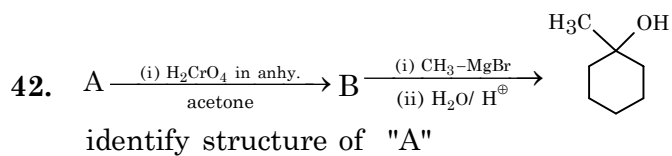
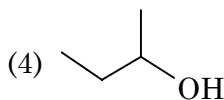
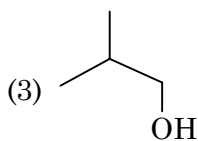
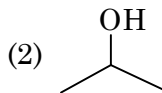
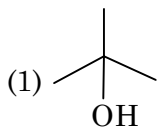
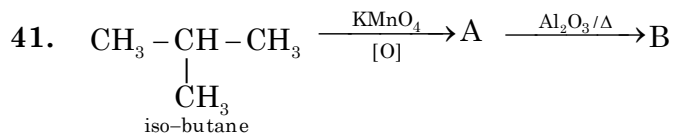
(4) $\frac{4 \times 10^{18}}{\pi r^2}$

40. 100 mL, 0.1 M CH_3COONH_4 विलयन के pH का मान x_1 पाया गया, अब इस विलयन में ताप स्थिर रखते हुए 400mL जल मिलाया गया तथा पुनः pH की गणना करने पर प्राप्त मान x_2 पाया गया। x_1 एवं x_2 का अनुपात होगा —

(दिया गया है : $Pka_{(NH_4^+)} = 9.3$, $Pka_{(CH_3COOH)} = 4.7$)

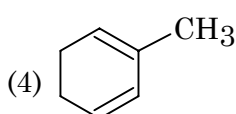
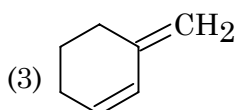
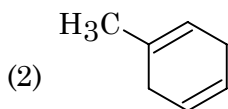
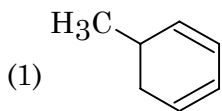
- (1) 1 (2) 7/5 (3) 12/7 (4) 2/3

कच्चे कार्य के लिए स्थान

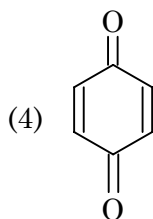
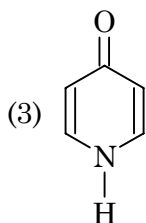
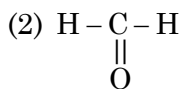
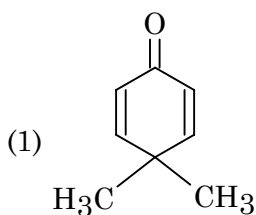


कच्चे कार्य के लिए स्थान

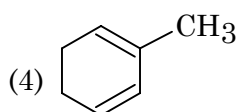
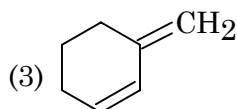
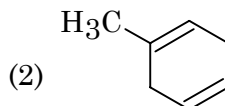
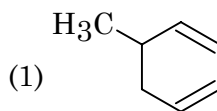
43. Which of the following alkene is most stable ?



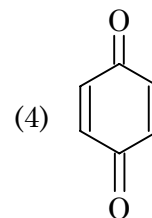
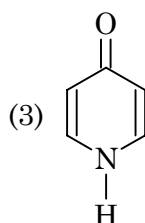
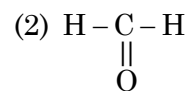
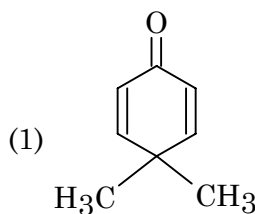
44. Which of the following compound show tautomerism



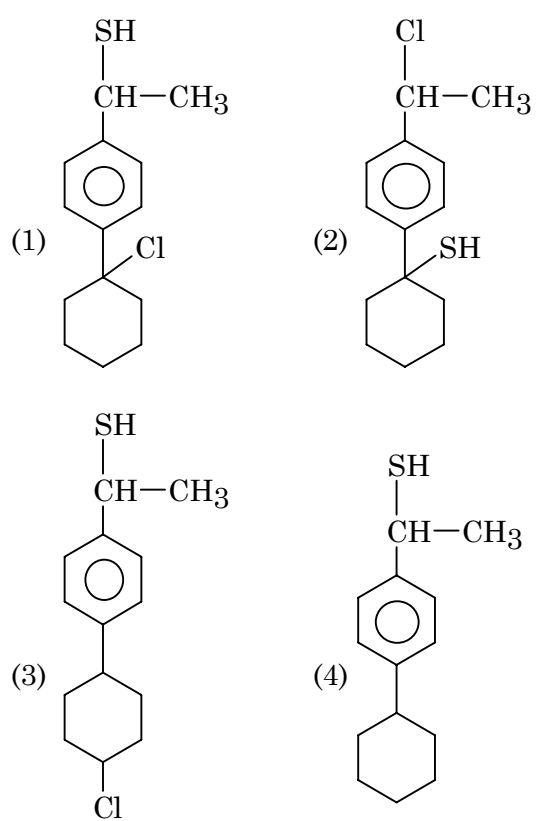
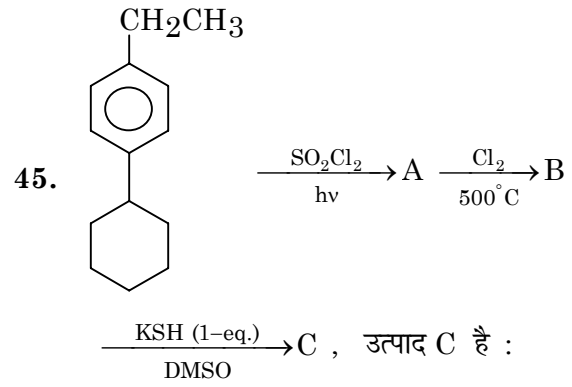
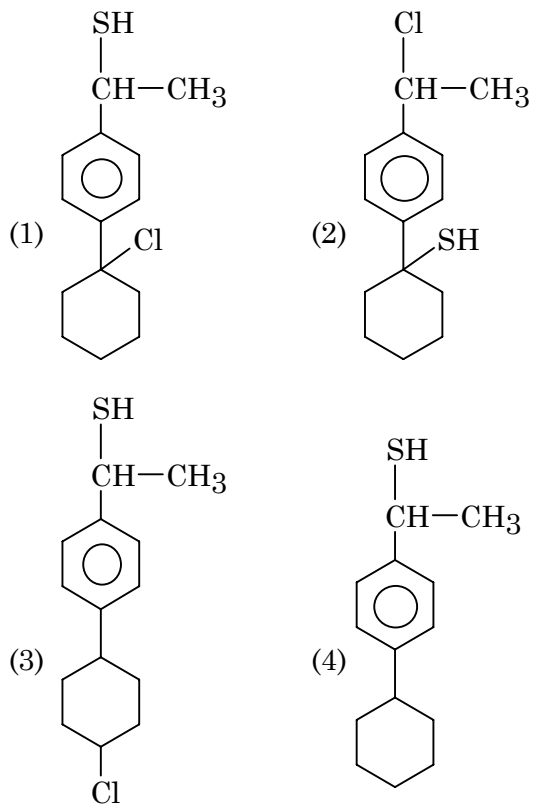
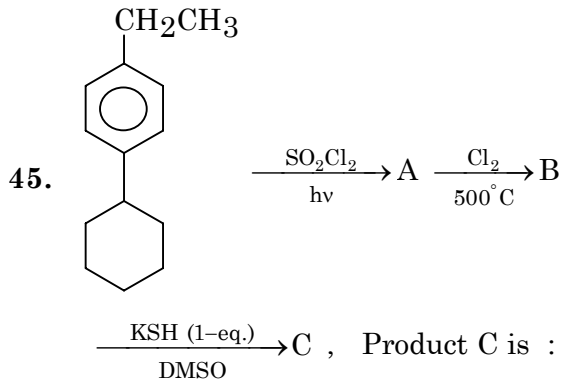
43. निम्न में से कौनसी एल्कीन सर्वाधिक स्थायी है ?



44. निम्न में से कौनसा यौगिक चलावयवता दर्शाता है ?

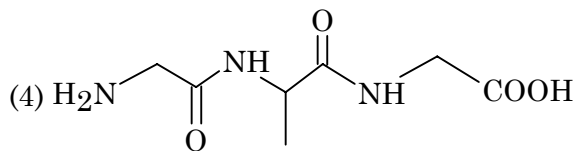
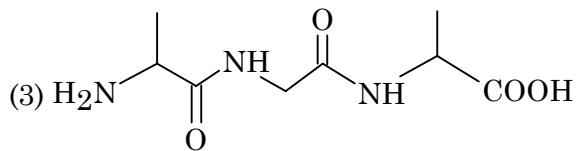
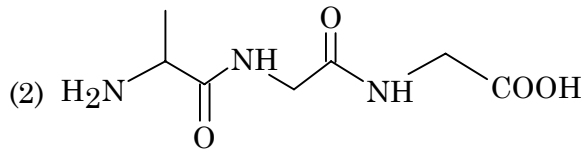
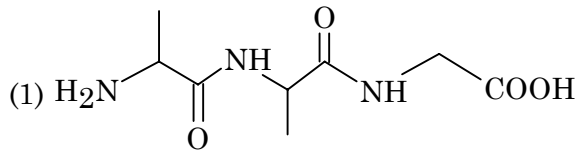


कच्चे कार्य के लिए स्थान

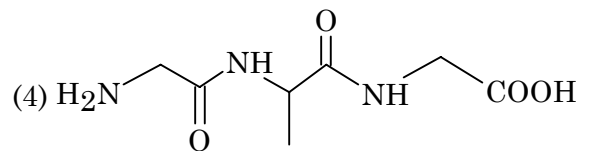
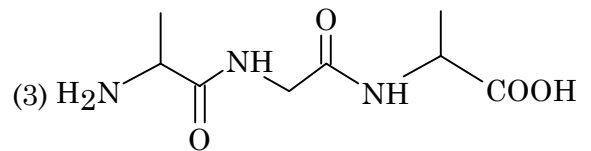
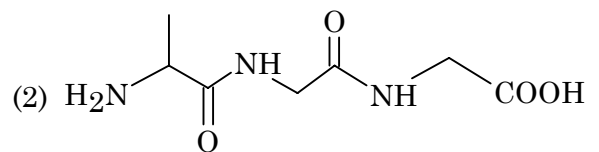
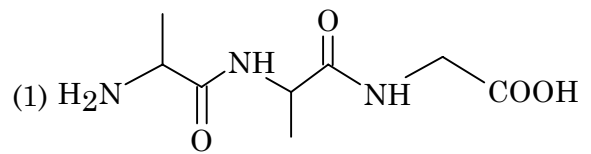


कच्चे कार्य के लिए स्थान

46. The correct structure of tripeptide made up of Alanine-Glycine-Alanine is :

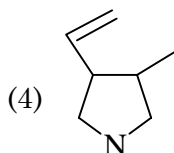
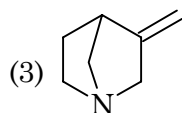
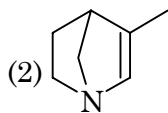
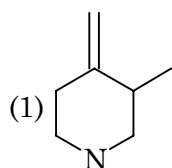
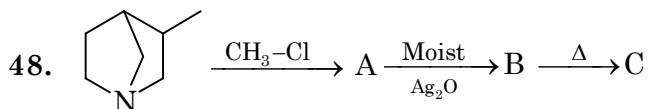
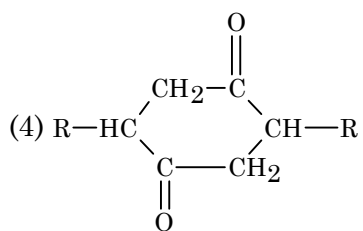
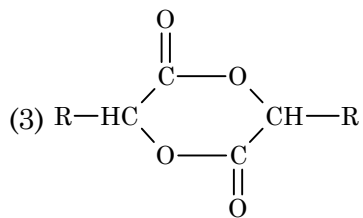
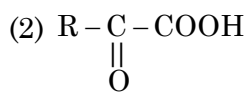
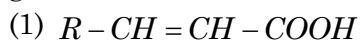


46. एलानिन-ग्लाइसीन-एलानिन से मिलकर बनने वाले ट्राइपेप्टाइड की सही संरचना होगी :

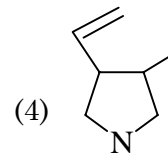
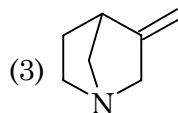
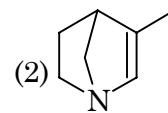
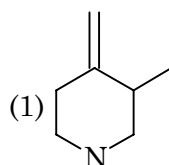
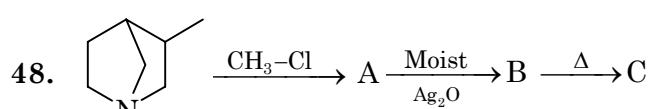
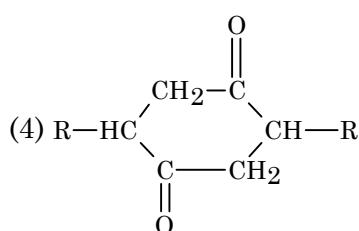
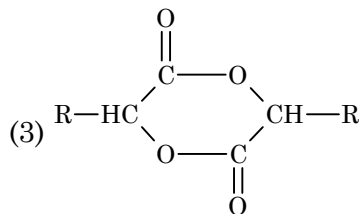
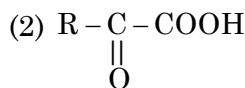
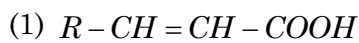


कच्चे कार्य के लिए स्थान

47. Compound RCH_2CO_2H (A) on reaction with $Br_2/Red P$ gives B which on reaction with aq KOH gives C which on heating gives D. Find out D.

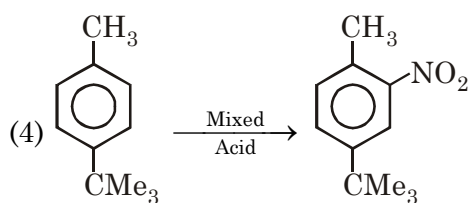
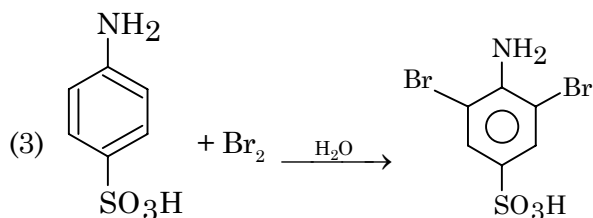
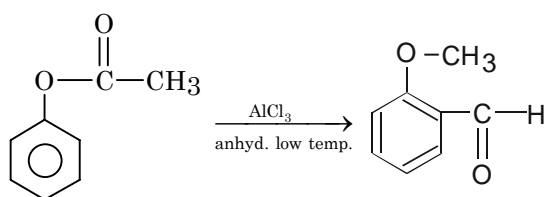
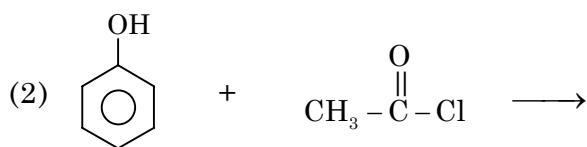
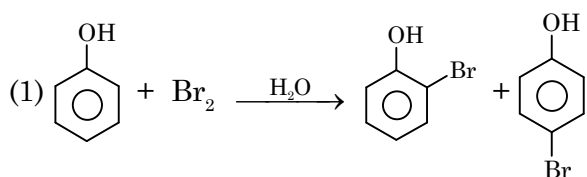


47. यौगिक RCH_2CO_2H (A) की अभिक्रिया $Br_2/लाल P$ से कराने पर B मिलता है और उसकी अभिक्रिया जलीय KOH के साथ करने पर C प्राप्त होता है जो गर्म किये जाने पर D देता है, D क्या है-

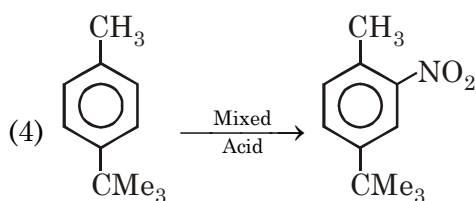
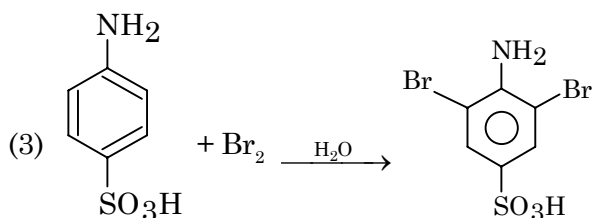
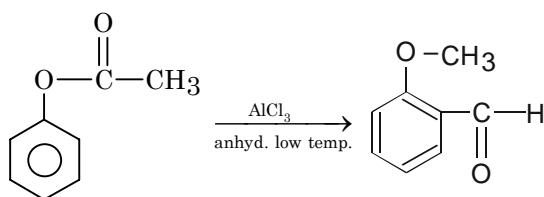
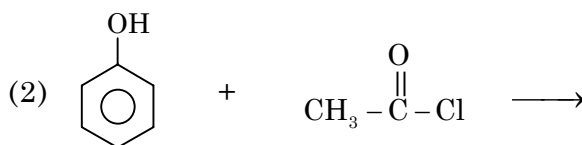
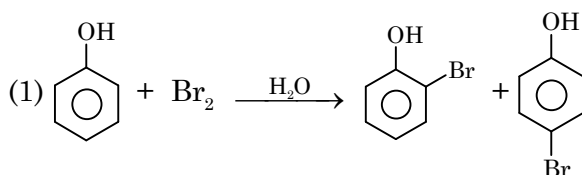


कच्चे कार्य के लिए स्थान

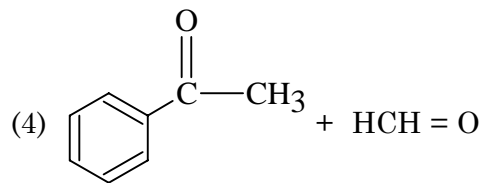
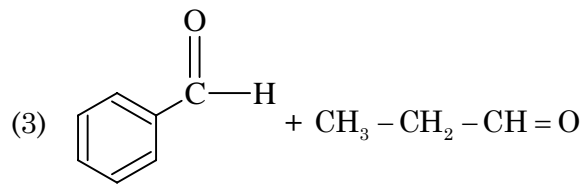
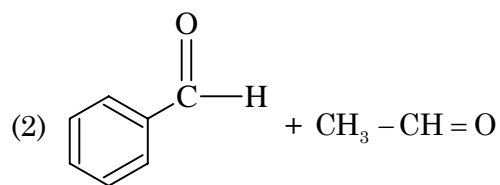
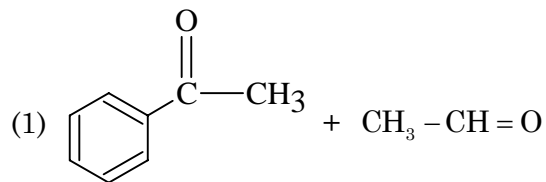
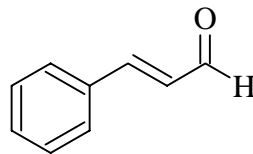
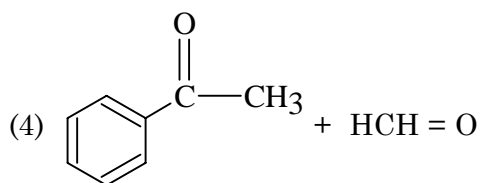
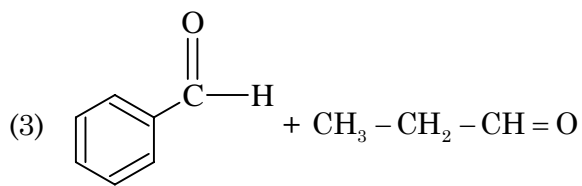
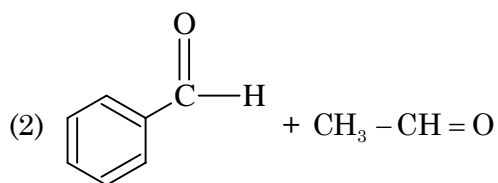
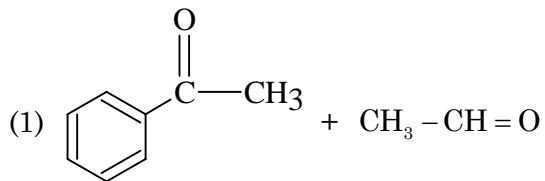
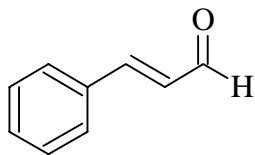
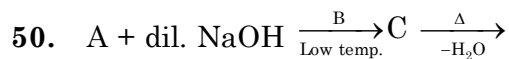
49. Out of the following which is correct :



49. निम्न में से कौन सी अभिक्रिया सही है :



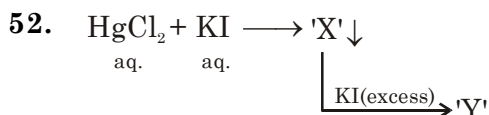
कच्चे कार्य के लिए स्थान



कच्चे कार्य के लिए स्थान

51. During the extraction of Cu from CuFeS_2 which of the following reaction does not occur :-

- (1) $\text{CuFeS}_2 \xrightarrow{\text{Partial Roasting}} \text{Cu}_2\text{S} + \text{FeS} + \text{SO}_2 + \text{Cu}_2\text{O}$
 (2) $\text{Cu}_2\text{S} + 2\text{Cu}_2\text{O} \longrightarrow 6\text{Cu} + \text{SO}_2$
 (3) $\text{FeO} + \text{SiO}_2 \longrightarrow \text{FeSiO}_3$
 (4) None of these

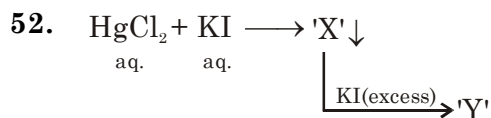


Select correct option :-

- (1) 'Y' is a mixture of black ppt. and water soluble complex
 (2) 'X' is green ppt.
 (3) 'Y' have sp^3 hybridisation of Hg
 (4) Neutral solution of 'Y' is used to detect NH_3 gas
53. Which of the following does not exist?
 (1) ClI_3 (2) XeH_4
 (3) BiF_5 (4) Both (1) and (2)
54. Octahedral complex $\text{Ma}_x\text{b}_y\text{c}_z$ have two geometrical isomers, both are optically inactive then correct set of x, y, z is :-
 (1) 4,2,0 (2) 3,3,0
 (3) 0,2,4 (4) All set of these are correct

51. CuFeS_2 से Cu के निष्कर्षण के दौरान, निम्न में से कौन सी अभिक्रिया नहीं होती है -

- (1) $\text{CuFeS}_2 \xrightarrow{\text{आंशिक भर्जन}} \text{Cu}_2\text{S} + \text{FeS} + \text{SO}_2 + \text{Cu}_2\text{O}$
 (2) $\text{Cu}_2\text{S} + 2\text{Cu}_2\text{O} \longrightarrow 6\text{Cu} + \text{SO}_2$
 (3) $\text{FeO} + \text{SiO}_2 \longrightarrow \text{FeSiO}_3$
 (4) इनमें से कोई नहीं

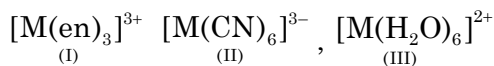


सही विकल्प चुनिए :-

- (1) 'Y', काले अवक्षेप तथा जल में विलेयशील संकुल का एक मिश्रण है
 (2) 'X', हरा अवक्षेप है
 (3) 'Y' में Hg का संकरण sp^3 है
 (4) 'Y' के उदासीन विलयन का प्रयोग NH_3 गैस की पहचान करने के लिए किया जाता है
53. निम्न में से कौन अस्तित्व नहीं रखता है ?
 (1) ClI_3 (2) XeH_4
 (3) BiF_5 (4) (1) व (2) दोनों
54. अष्टफलकीय संकुल $\text{Ma}_x\text{b}_y\text{c}_z$ के दो ज्यामितीय समावयवी हैं तथा दोनों प्रकाशिक अक्रिय हैं तो x, y, z का सही समुच्चय है :-
 (1) 4,2,0 (2) 3,3,0
 (3) 0,2,4 (4) सभी समुच्चय सही हैं

कच्चे कार्य के लिए स्थान

55. For three complex compounds



CORRECT information is :-

- (1) Order of Δ_0 will be I > II > III
- (2) Order of λ_{abs} will be III > II > I
- (3) All complex will show optical isomerism
- (4) All complex will not show geometrical isomerism

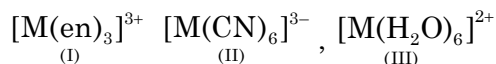
56. Which one has highest 2nd I.P value?

- (1) Mn
- (2) Cr
- (3) V
- (4) Ti

57. Which is the **CORRECT** maximum prescribed concentration of metals in ppm in drinking water

- (1) Al = 0.2
- (2) Fe = 0.3
- (3) Zn = 10
- (4) Cu = 6

55. तीन संकुल यौगिकों



के लिए सही सूचना है :-

- (1) Δ_0 का क्रम होगा I > II > III
- (2) λ_{abs} का क्रम होगा III > II > I
- (3) सभी संकुल प्रकाशिक समावयवता प्रदर्शित करेंगे
- (4) सभी संकुल ज्यामितिय समावयवता प्रदर्शित नहीं करेंगे

56. निम्न मे से किसका द्वितीय आयनन विभव अधिकतम होगा?

- (1) Mn
- (2) Cr
- (3) V
- (4) Ti

57. इनमे से कौन सा पीने के जल में धातु की सही अधिकतम मात्रा (ppm के अनुसार) है।

- (1) Al = 0.2
- (2) Fe = 0.3
- (3) Zn = 10
- (4) Cu = 6

कच्चे कार्य के लिए स्थान

- | | |
|---|--|
| <p>58. The metal chloride which produces apple green coloured flame when directly subjected to flame.</p> <p>(1) Barium
(2) Strontium
(3) Calcium
(4) Sodium</p> | <p>58. कौनसा धातु क्लोराइड, सीधे ज्वाला में गर्म किये जाने पर सेब जैसा हरा रंग उत्पन्न करेगा-</p> <p>(1) बेरियम
(2) स्ट्रान्शियम
(3) कैल्शियम
(4) सोडियम</p> |
| <p>59. What are the names assigned to elements after uranium</p> <p>(1) Transition elements
(2) Inner transition elements
(3) Trans uranic elements
(4) Transfermium elements</p> | <p>59. यूरेनियम के बाद के तत्वों का क्या नाम रखा गया है।</p> <p>(1) संक्रमण तत्व
(2) आन्तरिक संक्रमण तत्व
(3) ट्रान्सयूरेनिक तत्व
(4) ट्रान्सफरमियम तत्व</p> |
| <p>60. Which of the following molecule has bond order (2) & is diamagnetic</p> <p>(1) O₂
(2) C₂
(3) F₂
(4) Li₂</p> | <p>60. इनमे से किस अणु का बंध क्रम (2) तथा वह प्रतिचुम्बकीय है।</p> <p>(1) O₂
(2) C₂
(3) F₂
(4) Li₂</p> |

कच्चे कार्य के लिए स्थान

PART C - MATHEMATICS

61. Let $f_1 = \sum_{i=1}^3 a_i x_i$, $f_2 = \sum_{i=1}^3 b_i x_i$ and $f_3 = \sum_{i=1}^3 c_i x_i$.

If the equations $f_1 = f_2 = f_3 = 0$ has a non-trivial solution, then

(1) $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} \neq 0$ (2) $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$

(3) $\begin{vmatrix} a_1 & b_1 & c_3 \\ a_2 & b_2 & c_2 \\ a_1 & b_3 & c_3 \end{vmatrix} = 0$ (4) $\begin{vmatrix} a_1 & b_1 & 1 \\ a_2 & b_2 & 1 \\ a_3 & b_3 & 1 \end{vmatrix} = 0$

62. If p : It rains today, q : I go to school, r : I shall meet any friends and s : I shall go for a movie, then which of the following is the proposition :

If it does not rain or if I do not go to school, then I shall meet my friend and go for a movie.

- (1) $\sim(p \wedge q) \Rightarrow (r \wedge s)$
- (2) $\sim(p \wedge \sim q) \Rightarrow (r \wedge s)$
- (3) $\sim(p \wedge q) \Rightarrow (r \vee s)$
- (4) none of these

63. Let $f(x) = \sin 2x$ and $g(x) = \ln x$, then total number of solutions of $f(|x|) = |g(x)|$ will be ($x \in (0, \pi)$)

- (1) 1 (2) 2 (3) 3 (4) 4

61. माना कि $f_1 = \sum_{i=1}^3 a_i x_i$, $f_2 = \sum_{i=1}^3 b_i x_i$ तथा $f_3 = \sum_{i=1}^3 c_i x_i$ है।

यदि समीकरण $f_1 = f_2 = f_3 = 0$ का अनिर्बंधक हल है तो-

(1) $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} \neq 0$ (2) $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$

(3) $\begin{vmatrix} a_1 & b_1 & c_3 \\ a_2 & b_2 & c_2 \\ a_1 & b_3 & c_3 \end{vmatrix} = 0$ (4) $\begin{vmatrix} a_1 & b_1 & 1 \\ a_2 & b_2 & 1 \\ a_3 & b_3 & 1 \end{vmatrix} = 0$

62. यदि p : आज बारिश हुई, q : मैं स्कूल जाता हूँ, r : मैं किसी दोस्त से मिलूँगा, s : मैं सिनेमा देखने जाऊँगा, तब निम्न में कौनसा कथन, है :

यदि आज बारिश नहीं हुई या यदि मैं स्कूल नहीं जाता हूँ, तब मैं अपने दोस्त से मिलूँगा तथा सिनेमा देखने जाऊँगा, है

- (1) $\sim(p \wedge q) \Rightarrow (r \wedge s)$
- (2) $\sim(p \wedge \sim q) \Rightarrow (r \wedge s)$
- (3) $\sim(p \wedge q) \Rightarrow (r \vee s)$
- (4) इनमें से कोई नहीं

63. माना कि $f(x) = \sin 2x$ तथा $g(x) = \ln x$ है। तो समीकरण $f(|x|) = |g(x)|$ के अन्तराल ($x \in (0, \pi)$) में कुल हलों की संख्या होगी-

- (1) 1 (2) 2 (3) 3 (4) 4

कच्चे कार्य के लिए स्थान

64. Probability that a student is passed in mathematics is $1/4$ and probability that he is passed in physics is $1/5$. Probability that he is passed in both the subjects is $3/20$. What is the probability that he is passed in mathematics if he has been failed in physics.
- (1) $3/4$ (2) $1/8$ (3) $3/16$ (4) $5/8$
65. Let z_1, z_2 are any complex numbers which satisfies the following conditions $|z_1| = 12$ and $|z_2 - \sqrt{3} - i| = 5$ respectively then range of values of $|z_1 - z_2|$ will be
- (1) $[6, 18]$ (2) $[5, 19]$
 (3) $\{5, 19\}$ (4) $(5, 19)$
66. Let $A(h, k), B(1, 1)$ and $C(2, 1)$ be vertices of a right angled triangle with AC as its hypotenuse. If area of triangle is 2, then value of $h^2 + k^2$ will be.
- (1) 25 (2) 9 (3) 26 (4) 11
67. Let $3x + 4y + z - 3 = 0$ ($P_1 = 0$) and $6x + 8y + 2z - 5 = 0$ ($P_2 = 0$) be the two given planes, then equation of plane which divides the distance between the planes $P_1 = 0$ and $P_2 = 0$ in the ratio $2 : 3$ is
- (1) $3x + 4y + z + 14 = 0$
 (2) $15x + 20y + 5z - 14 = 0$
 (3) $3x + 4y + z - 14 = 0$
 (4) $15x + 20y + 5z + 14 = 0$
64. किसी विद्यार्थी के गणित में उत्तीर्ण होने की प्रायिकता $1/4$ तथा भौतिकी में उत्तीर्ण होने की प्रायिकता $1/5$ है। विद्यार्थी के दोनों विषयों में उत्तीर्ण होने की प्रायिकता $3/20$ है। विद्यार्थी के गणित में उत्तीर्ण होने की प्रायिकता क्या होगी, यदि वह भौतिकी में अनुत्तीर्ण हो चुका है -
- (1) $3/4$ (2) $1/8$ (3) $3/16$ (4) $5/8$
65. माना कि z_1, z_2 कोई दो सम्मिश्र संख्याएँ जो क्रमशः प्रतिबन्ध $|z_1| = 12$ तथा $|z_2 - \sqrt{3} - i| = 5$ को संतुष्ट करती है, तो $|z_1 - z_2|$ का परिसर होगा -
- (1) $[6, 18]$ (2) $[5, 19]$
 (3) $\{5, 19\}$ (4) $(5, 19)$
66. माना कि $A(h, k), B(1, 1)$ तथा $C(2, 1)$ किसी समकोण त्रिभुज के शीर्ष है जिसका विर्कण AC है। यदि उस त्रिभुज का क्षेत्रफल 2 है। तो $h^2 + k^2$ का मान होगा
- (1) 25 (2) 9 (3) 26 (4) 11
67. माना $3x + 4y + z - 3 = 0$ ($P_1 = 0$) तथा $6x + 8y + 2z - 5 = 0$ ($P_2 = 0$) दो दिए गए समतल है। यदि एक समतल दिये गए समतलों $P_1 = 0$ तथा $P_2 = 0$ के मध्य की दूरी को $2 : 3$ में विभाजित करता है तो उस समतल का समीकरण है -
- (1) $3x + 4y + z + 14 = 0$
 (2) $15x + 20y + 5z - 14 = 0$
 (3) $3x + 4y + z - 14 = 0$
 (4) $15x + 20y + 5z + 14 = 0$

कच्चे कार्य के लिए स्थान

68. The greatest value of $f(x) = \log_{\sqrt{48}}(x^2 - 4x + 3)$ on interval $[-5, 5]$ is
- (1) 1 (2) $\frac{1}{2}$
(3) 2 (4) 4
69. $\tan^{-1}\frac{3}{5} + \tan^{-1}\frac{3}{29} + \tan^{-1}\frac{3}{71} + \tan^{-1}\frac{3}{131} + \dots$
n terms =
- (1) $\tan^{-1}\frac{3}{2+3n}$ (2) $\tan^{-1}\frac{3n}{2n+3}$
(3) $\tan^{-1}\frac{3n}{1+4n}$ (4) $\tan^{-1}\frac{3n}{2+3n}$
70. Area bounded by curve $y^2 = 4x$ and lines $y = x$ and $y = 2x$ is
- (1) 1 (2) $\frac{7}{3}$
(3) $\frac{8}{3}$ (4) $\frac{1}{3}$
71. If $y(x)$ is solution of $x\frac{dy}{dx} + 3y = x$, $y(2) = 1$ then value of $y(1)$ is
- (1) $\frac{17}{4}$ (2) 4
(3) 9 (4) -9

68. फलन $f(x) = \log_{\sqrt{48}}(x^2 - 4x + 3)$ का अंतराल $[-5, 5]$ में अधिकतम मान है -
- (1) 1 (2) $\frac{1}{2}$ (3) 2 (4) 4
69. $\tan^{-1}\frac{3}{5} + \tan^{-1}\frac{3}{29} + \tan^{-1}\frac{3}{71} + \tan^{-1}\frac{3}{131} + \dots$
n पद =
- (1) $\tan^{-1}\frac{3}{2+3n}$ (2) $\tan^{-1}\frac{3n}{2n+3}$
(3) $\tan^{-1}\frac{3n}{1+4n}$ (4) $\tan^{-1}\frac{3n}{2+3n}$
70. वक्र $y^2 = 4x$ तथा रेखाओं $y = x$ एवं $y = 2x$ द्वारा परिबद्ध क्षेत्रफल है -
- (1) 1 (2) $\frac{7}{3}$
(3) $\frac{8}{3}$ (4) $\frac{1}{3}$
71. यदि $y(x)$ अवकल समीकरण $x\frac{dy}{dx} + 3y = x$, $y(2) = 1$ का हल हो, तो $y(1)$ का मान है -
- (1) $\frac{17}{4}$ (2) 4
(3) 9 (4) -9

कच्चे कार्य के लिए स्थान

72. A vertical lamp post of height 8m stands at the centre of a equilateral triangular field. The angle of elevation of its top from each vertices of triangle is 45° . The area of triangular field is :

- (1) $16\sqrt{3}$ (2) $32\sqrt{3}$
 (3) $48\sqrt{3}$ (4) $72\sqrt{3}$

73. If shortest distance between the skew lines $r = (4\hat{i} - \hat{j}) + \lambda(\hat{i} + 2\hat{j} - 3\hat{k})$ and $r = (\hat{i} - \hat{j} + 2\hat{k}) + \mu(2\hat{i} + 4\hat{j} - 5\hat{k})$ is ℓ , then value of $[\ell]$ is : (where $[\]$ is greatest integer function)

- (1) 1 (2) 2 (3) 3 (4) 4

74. If A is a square matrix of order n such that $|adj(adjA)| = |A|^{P^2}$, (where P is a prime number), then n can not be :

- (1) 4 (2) 8 (3) 10 (4) 12

75. If $A_n = \int_0^{\pi/2} \frac{\sin(2n-1)x}{\sin x} dx$ then value of $\frac{A_{1000}}{A_{10}}$ is -

- (1) 1 (2) 10
 (3) 100 (4) None

72. एक 8 सेमी. ऊँचाई का बिजली का खम्भा एक समबाहु त्रिभुजाकार क्षेत्र के केन्द्र पर उर्ध्वाधर खड़ा है। यदि त्रिभुज के किसी भी शीर्ष से खम्बे के शीर्ष का उन्नयन कोण 45° हो, तो त्रिभुजाकार क्षेत्र का क्षेत्रफल है -

- (1) $16\sqrt{3}$ (2) $32\sqrt{3}$
 (3) $48\sqrt{3}$ (4) $72\sqrt{3}$

73. यदि विषमतलीय रेखाओं $r = (4\hat{i} - \hat{j}) + \lambda(\hat{i} + 2\hat{j} - 3\hat{k})$ तथा $r = (\hat{i} - \hat{j} + 2\hat{k}) + \mu(2\hat{i} + 4\hat{j} - 5\hat{k})$ के मध्य न्यूनतम दूरी ℓ है तो $[\ell]$ का मान होगा : (जहाँ $[\]$ महत्तम पूर्णांक फलन है)

- (1) 1 (2) 2 (3) 3 (4) 4

74. यदि A एक 2 कोटि का वर्ग आव्यूह है तथा $|adj(adjA)| = |A|^{P^2}$ (जहाँ P एक अभाज्य संख्या है), तब n का मान निम्न में से कौनसा संभव नहीं है :

- (1) 4 (2) 8 (3) 10 (4) 12

75. यदि $A_n = \int_0^{\pi/2} \frac{\sin(2n-1)x}{\sin x} dx$ तब $\frac{A_{1000}}{A_{10}}$ का मान होगा -

- (1) 1 (2) 10
 (3) 100 (4) कोई नहीं

कच्चे कार्य के लिए स्थान

- | | |
|--|--|
| <p>76. If 9th, 13th and 15th terms of an A.P. are first three terms of a G.P. whose sum of infinite terms is 80, then first term of A.P. is :</p> <p>(1) 40 (2) 64
(3) 80 (4) 96</p> <p>77. If a variable tangent of the circle $x^2 + y^2 = 1$ intersect the ellipse $x^2 + 2y^2 = 4$ at P and Q, then locus of point of intersection of tangents at P and Q is an ellipse whose eccentricity is equal to :</p> <p>(1) $\sin 36^\circ$ (2) $\cos 36^\circ$
(3) $\cos 60^\circ$ (4) $\sin 60^\circ$</p> <p>78. $\lim_{x \rightarrow 0} \frac{\cos 5x \cos 2x - \cos 7x \cos 10x}{\ln^2 (\sin x + \cos x)^2}$ is equal to :</p> <p>(1) 10 (2) 15
(3) 20 (4) 24</p> <p>79. The value of μ for which the line $y = \mu x + 2$ become a tangent to the hyperbola $4x^2 - 9y^2 = 36$ is</p> <p>(1) $\pm \frac{2}{3}$ (2) $\pm \frac{2\sqrt{2}}{3}$
(3) $\pm \frac{8}{9}$ (4) $\pm \frac{4\sqrt{2}}{3}$</p> | <p>76. यदि किसी A.P. का 9वाँ, 13वाँ तथा 15वाँ पद किसी G.P. के पहले 3 पद हैं जहाँ G.P. के अनन्त पदों का योग 80 है, तब A.P. का प्रथम पद होगा।</p> <p>(1) 40 (2) 64
(3) 80 (4) 96</p> <p>77. यदि वृत्त $x^2 + y^2 = 1$ की एक चर स्पर्शज्या, दीर्घवृत्त $x^2 + 2y^2 = 4$ को बिन्दुओं P तथा Q पर प्रतिच्छेद करती है, तब बिन्दुओं P तथा Q पर खींची गयी स्पर्शज्याओं के प्रतिच्छेद बिन्दुओं का बिन्दुपथ एक दीर्घवृत्त होगा जिसकी उत्केन्द्रता का मान बराबर होगा।</p> <p>(1) $\sin 36^\circ$ (2) $\cos 36^\circ$
(3) $\cos 60^\circ$ (4) $\sin 60^\circ$</p> <p>78. $\lim_{x \rightarrow 0} \frac{\cos 5x \cos 2x - \cos 7x \cos 10x}{\ln^2 (\sin x + \cos x)^2}$ का मान होगा-</p> <p>(1) 10 (2) 15
(3) 20 (4) 24</p> <p>79. μ का वह मान जिसके लिये रेखा $y = \mu x + 2$, अतिपरवलय $4x^2 - 9y^2 = 36$ की स्पर्श रेखा है, होगा -</p> <p>(1) $\pm \frac{2}{3}$ (2) $\pm \frac{2\sqrt{2}}{3}$
(3) $\pm \frac{8}{9}$ (4) $\pm \frac{4\sqrt{2}}{3}$</p> |
|--|--|

कच्चे कार्य के लिए स्थान

80. If $\vec{x} = \hat{i} - \hat{j}$, $\vec{y} = \hat{i} + \hat{j} + k$ are two vectors and \vec{z} is another vector such that $\vec{x} \times \vec{z} + \vec{y} = \vec{0}$ and $\vec{x} \cdot \vec{z} = 0$, then $|\vec{z}|^2$ is equal to

- (1) $\frac{19}{2}$ (2) $\frac{15}{2}$
 (3) $\frac{3}{2}$ (4) $\frac{1}{2}$

81. Let $f(x) = ax + b$ is a function such that $f^{-1}(2) = 3$, $f^{-1}(-3) = 6$, where $f^{-1}(x)$ is the inverse of function f then $a + b$ is equal to

- (1) $\frac{3}{2}$ (2) $\frac{16}{3}$
 (3) $\frac{14}{3}$ (4) $\frac{7}{3}$

82. If the tangent to the curve $y^2 = x^3$ at the point (α^2, α^3) is also normal to the curve at the point (β^2, β^3) , then the value of $\alpha\beta$ is

- (1) $-\frac{1}{9}$ (2) $-\frac{2}{9}$
 (3) $-\frac{1}{3}$ (4) $-\frac{4}{9}$

80. यदि $\vec{x} = \hat{i} - \hat{j}$, $\vec{y} = \hat{i} + \hat{j} + k$ दो संदिश है तथा अन्य संदिश \vec{z} इस प्रकार है कि $\vec{x} \times \vec{z} + \vec{y} = \vec{0}$ तथा $\vec{x} \cdot \vec{z} = 0$, तब $|\vec{z}|^2$ का मान है -

- (1) $\frac{19}{2}$ (2) $\frac{15}{2}$
 (3) $\frac{3}{2}$ (4) $\frac{1}{2}$

81. माना कि $f(x) = ax + b$ एक फलन इस प्रकार है कि $f^{-1}(2) = 3$ तथा $f^{-1}(-3) = 6$, जहाँ $f^{-1}(x)$ फलन $f(x)$ का प्रतिलोम है, तब $a + b$ का मान है -

- (1) $\frac{3}{2}$ (2) $\frac{16}{3}$
 (3) $\frac{14}{3}$ (4) $\frac{7}{3}$

82. यदि वक्र $y^2 = x^3$ के बिन्दु (α^2, α^3) पर खींची गयी स्पर्श रेखा वक्र के बिन्दु (β^2, β^3) पर अभिलम्ब है, तब $\alpha\beta$ का मान है-

- (1) $-\frac{1}{9}$ (2) $-\frac{2}{9}$
 (3) $-\frac{1}{3}$ (4) $-\frac{4}{9}$

कच्चे कार्य के लिए स्थान

83. If x and y are positive integers, then ${}^x C_r + {}^x C_{r-1} {}^y C_1 + {}^x C_{r-2} {}^y C_2 + \dots + {}^y C_r$ is equal to
- (1) $\frac{x!y!}{r!}$ (2) $\frac{(x+y)!}{r!}$
 (3) ${}^{x+y} C_r$ (4) ${}^{xy} C_r$
84. The mean and variance of a random variable x having a binomial distribution are 4 and 2 respectively, then the value of $P(x=1)$ is
- (1) $\frac{1}{4}$ (2) $\frac{1}{16}$ (3) $\frac{1}{8}$ (4) $\frac{1}{32}$
85. Each of " n " urns contain 4 white and 6 black balls. The $(n+1)^{\text{th}}$ urn contain 5 white and 5 black balls. One of the urn is chosen at random and two balls are drawn from it without replacement. Both the balls turn out to be black. If the probability that the $(n+1)^{\text{th}}$ urn was chosen to draw the ball is $\frac{1}{16}$, then value of n is
- (1) 10 (2) 11 (3) 12 (4) 13
86. How many three digit numbers satisfy the property that the middle digit is arithmetic mean of the first and the last digit
- (1) 41 (2) 45 (3) 43 (4) 44
83. यदि x तथा y धनात्मक पूर्णांक है, तो ${}^x C_r + {}^x C_{r-1} {}^y C_1 + {}^x C_{r-2} {}^y C_2 + \dots + {}^y C_r$ का मान है -
- (1) $\frac{x!y!}{r!}$ (2) $\frac{(x+y)!}{r!}$
 (3) ${}^{x+y} C_r$ (4) ${}^{xy} C_r$
84. एक यादृच्छिक चर x का माध्य व प्रसरण क्रमशः 4 तथा 2 है, तो $P(x=1)$ का मान है -
- (1) $\frac{1}{4}$ (2) $\frac{1}{16}$ (3) $\frac{1}{8}$ (4) $\frac{1}{32}$
85. " n " संदूकों में से प्रत्येक में 4 सफेद और 6 काली गेंदें रखी है। $(n+1)$ वे संदूक में 5 सफेद और 5 काली गेंदें रखी है। इनमें से एक संदूक को यादृच्छया चुना जाता है। और इससे दो गेंदें बिना वापस रखे निकाली जाती है। बाहर निकाली गई दोनों गेंदें काली है। यदि $(n+1)$ वें संदूक को चुनकर निकाली गई गेंद की प्रायिकता $\frac{1}{16}$ है, तब n का मान है।
- (1) 10 (2) 11 (3) 12 (4) 13
86. तीन अंकों कि कुल कितनी संख्याएँ है, जिसमें मध्य अंक प्रथम तथा अंतिम अंकों का समान्तर माध्य है।
- (1) 41 (2) 45 (3) 43 (4) 44

कच्चे कार्य के लिए स्थान

87. If $2f(x) + xf\left(\frac{1}{x}\right) - 2f\left\{\sqrt{2}\sin\pi\left(x + \frac{1}{4}\right)\right\}$

$= 4\cos^2\frac{\pi x}{2} + x\cos\frac{\pi}{x} \forall x \in R - \{0\}$, then

$f(2) + f(1) + 3f\left(\frac{1}{2}\right) = \dots$

- (1) 1 (2) 0 (3) 2 (4) 4

88. A parabola touch lines $x - y = 0$ and $x + y + 2 = 0$ at points $M(1, 1)$ and $N(0, -2)$ respectively, then the equation of the directrix is :

- (1) $3x + y + 4 = 0$ (2) $x - 3y - 2 = 0$
(3) $8x - y + 7 = 0$ (4) None of these

89. If $\cos^4\theta + \alpha, \sin^4\theta + \alpha$ are the roots of equation $x^2 + 4x + 2 = 0$ and $\cos^2\theta + \beta, \sin^2\theta + \beta$ are the roots of equation $x^2 + 2bx + b = 0$ then sum of all possible values of $b =$

- (1) 1 (2) -1 (3) 2 (4) -2

90. If $g(x)$ is non-negative continuous function such that $g(x) + g\left(x + \frac{1}{2}\right) = 2$

then the value of $\int_0^1 (\sin(8\pi x))g(x) dx =$

- (1) 0 (2) 1 (3) $\frac{1}{2}$ (4) -1

87. यदि $2f(x) + xf\left(\frac{1}{x}\right) - 2f\left\{\sqrt{2}\sin\pi\left(x + \frac{1}{4}\right)\right\}$

$= 4\cos^2\frac{\pi x}{2} + x\cos\frac{\pi}{x} \forall x \in R - \{0\}$, तब

$f(2) + f(1) + 3f\left(\frac{1}{2}\right) = \dots$

- (1) 1 (2) 0 (3) 2 (4) 4

88. एक परवलय रेखाओं $x - y = 0$ तथा $x + y + 2 = 0$ को क्रमशः बिन्दुओं $M(1, 1)$ तथा $N(0, -2)$ पर स्पर्श करता है। तब परवलय की नियता का समीकरण है

- (1) $3x + y + 4 = 0$ (2) $x - 3y - 2 = 0$
(3) $8x - y + 7 = 0$ (4) इनमे से कोई नहीं

89. यदि $\cos^4\theta + \alpha, \sin^4\theta + \alpha$ समीकरण

$x^2 + 4x + 2 = 0$ के मूल है। तथा

$\cos^2\theta + \beta, \sin^2\theta + \beta$ समीकरण

$x^2 + 2bx + b = 0$ के मूल है। तब b के सभी संभव मानों का योग है।

- (1) 1 (2) -1 (3) 2 (4) -2

90. यदि $g(x)$ अऋणात्मक सतत् फलन है जो इस प्रकार है कि $g(x) + g\left(x + \frac{1}{2}\right) = 2$

तब $\int_0^1 (\sin(8\pi x))g(x) dx =$

- (1) 0 (2) 1 (3) $\frac{1}{2}$ (4) -1

कच्चे कार्य के लिए स्थान

कच्चे कार्य के लिए स्थान