

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

LEADER & ENTHUSIAST COURSE

TARGET : JEE (MAIN) 2019

Test Type : **ALL INDIA OPEN TEST**

Test Pattern : JEE-Main

TEST DATE : 23 - 12 - 2018

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.
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PART A - PHYSICS

1. The self energy of a conducting shell of radius R & charge Q is :-

- (1) $\frac{kQ^2}{R}$ (2) $\frac{kQ^2}{2R}$ (3) $\frac{2kQ^2}{R}$ (4) $\frac{3kQ^2}{5R}$

2. A small ball connected to a thread is submerged in a liquid and made to oscillate like a simple pendulum. The time period is T_1 if we consider buoyant force as well as viscous force. If there is no viscous force but there is a buoyant force, the time period is T_2 :-

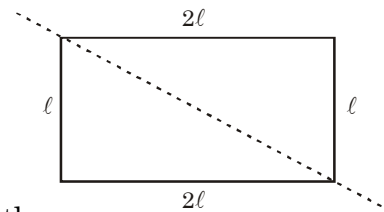
- (1) T_1 can be equal to T_2
 (2) T_1 is always equal to T_2
 (3) $T_1 > T_2$
 (4) $T_1 < T_2$

3. An electric iron rated at 120 V has a power of 400 W. When it is switched on, the voltage across the socket drops from 124 V to 120 V. What is the resistance of connecting wire :-

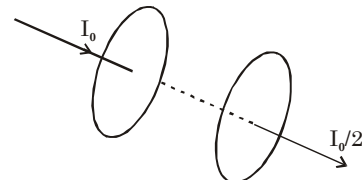
- (1) 3.6 Ω (2) 1.2 Ω
 (3) 2.4 Ω (4) 4.8 Ω

4. What is the moment of inertia of a uniform rigid rectangular wire frame about its diagonal? (mass of frame = m)

- (1) $\frac{m\ell^2}{6}$
 (2) $\frac{4}{15}m\ell^2$
 (3) $\frac{2m\ell^2}{9}$
 (4) None of these



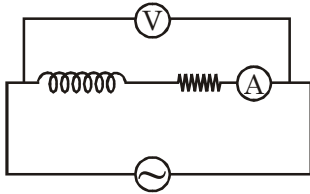
5. Two polarizers are placed parallel to each other in the path of a beam of unpolarized light of intensity I_0 . The intensity of emergent beam is $\frac{I_0}{2}$. If the first polarizer is rotated about the line shown :-



- (1) Intensity of emergent beam remains constant.
 (2) Intensity of emergent beam decreases to zero and then increases to $\frac{I_0}{2}$ again
 (3) The intensity of emergent beam increases and then decreases.
 (4) The intensity of emergent beam decreases (but not to zero) and then increases again to $\frac{I_0}{2}$

SPACE FOR ROUGH WORK

6. A series LR circuit is connected to an AC source and ideal AC ammeter reads 1A. If the inductive reactance is 30Ω and resistance is 40Ω , what is the power consumed by the circuit?

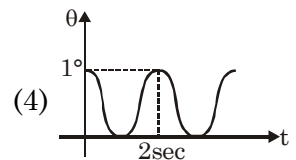
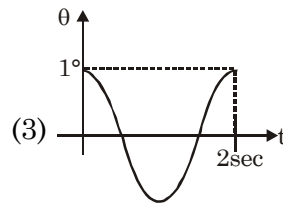
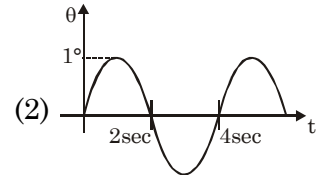
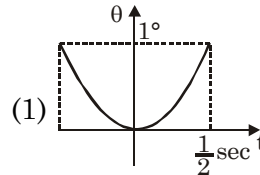


- (1) 50 W (2) 100 W
(3) 80 W (4) 40 W
7. What is the approximate wavelength of 1st line of paschen series of hydrogen atom ?
- (1) 1870 nm
(2) 2460 nm
(3) 656 nm
(4) 122 nm
8. If the sides of a rectangle are 45.1 cm and 2.32 cm, what is the perimeter correct to significant digits ?
- (1) 94.84 cm
(2) 94.8 cm
(3) 95 cm
(4) 94.862 cm

9. A road is banked at an angle of 37° . If a car moving at 54 km/hr does not experience any friction force while negotiating the curve, the radius of curve is :-

- (1) $\frac{67.5}{4}$ m (2) 45 m
(3) 54 m (4) 30 m

10. A simple pendulum has a string of length 1m. If the angular amplitude is 1° , which of the following can represent its angular displacement from mean position as a function of time :-



SPACE FOR ROUGH WORK

11. Infinite line charge of charge/length 5nC/m lies along line $x = y$ in the xy plane. Find the electric field at $(0, 0, 4)\text{m}$:-

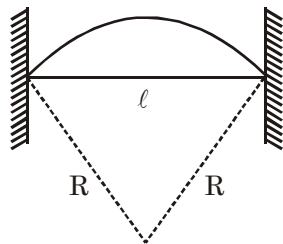
- (1) $22.5\hat{k}\frac{\text{V}}{\text{m}}$ (2) $\frac{22.5}{\sqrt{2}}(+\hat{i}-\hat{j})\frac{\text{V}}{\text{m}}$
 (3) $-22.5\hat{k}\frac{\text{V}}{\text{m}}$ (4) $\frac{22.5}{\sqrt{2}}(-\hat{i}+\hat{j})\frac{\text{V}}{\text{m}}$

12. The efficiency of a carnot cycle on a monoatomic gas is 50%. The lowest temperature during the cycle is 27°C . If there are 3 mole of gas, what is the change in its internal energy during adiabatic expansion during the cycle ?

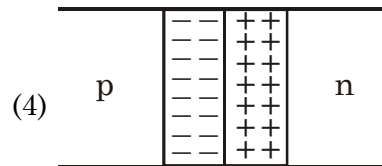
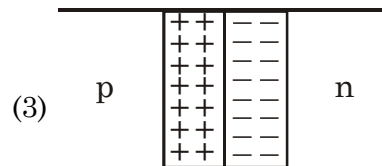
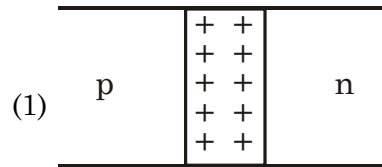
- (1) -11.25 kJ (2) 11.25 kJ
 (3) 101.25 J (4) -101.25 J

13. A rod of length ℓ , coefficient of thermal expansion α is heated by a temperature difference ΔT . It was constrained between two walls at a distance ℓ . As a result, it bends to form a circular arc. The radius of arc is :-

- (1) $\frac{\ell}{2\alpha\Delta T}$
 (2) $\frac{\ell}{6\alpha\Delta T}$
 (3) $\frac{\ell}{2\sqrt{6\alpha\Delta T}}$
 (4) $\frac{\ell}{3\sqrt{3\alpha\Delta T}}$

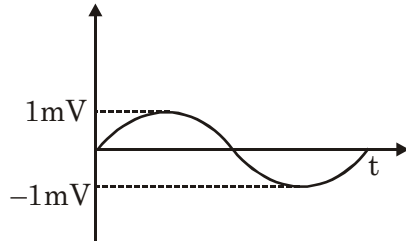


14. The depletion region of a p-N junction diode contains immobile ions. Which of the following figures correctly show the sign of those ions :-

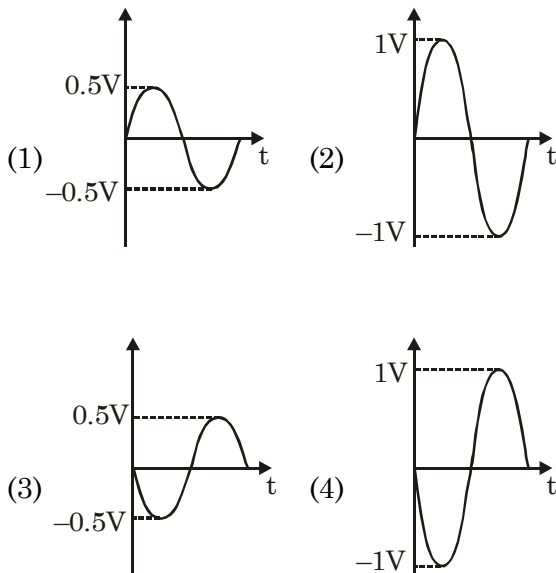


SPACE FOR ROUGH WORK

15. For an npn transistor $R_{out} = 1.2 \times 10^5 \Omega$, $R_{in} = 6000 \Omega$, $\beta = 50$. It is connected to amplify an input signal in active mode in common emitter configuration. The input signal is :



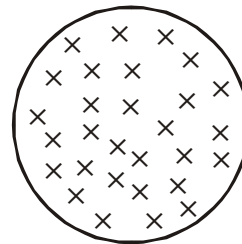
The output signal looks like.



16. Light emitted from a star (assumed to be a black body) has a maximum intensity at wavelength λ . If a helium gas sample has same temperature as that of the star, de-broglie wavelength of its atoms moving at v_{rms} would be proportional to :-

- (1) $\sqrt{\lambda}$ (2) $\frac{1}{\sqrt{\lambda}}$
(3) λ^2 (4) $\frac{1}{\lambda^2}$

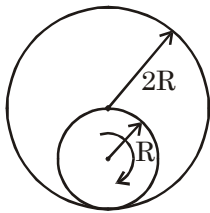
17. A uniform magnetic field $B = kt$ is passing perpendicular to plane of a ring of resistance R . k is a constant and t is time. If resistance of the ring is constant, the current flowing through the ring is :-



- (1) Clockwise and constant
(2) Anticlockwise and constant
(3) Zero
(4) Anticlockwise and increasing with time

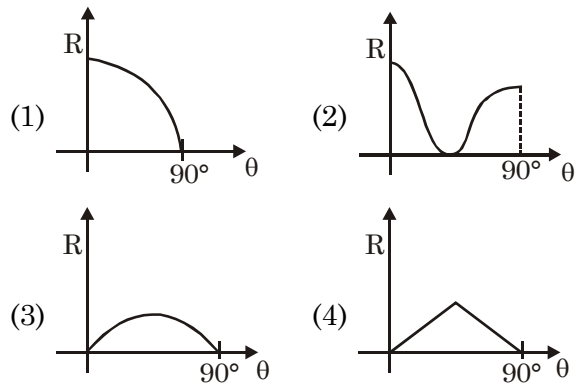
SPACE FOR ROUGH WORK

18. A wheel of radius R is rolling inside a fixed circular cylinder of radius $2R$ as shown. What is the trajectory followed by a point on the rim of the wheel :-



- (1) Circle (2) Cycloid
(3) Straight line (4) None of these
19. A string fixed at both the ends is oscillating in its 3rd overtone. If the tension in the string is 10N, its mass is 1gm and length is 4m, what is its frequency ?
(1) 75 Hz (2) 100Hz (3) 125Hz (4) 10 Hz
20. The correct order of most probable speed (v_{mp}), root mean square speed (v_{rms}), and average speed (v_{av}) of molecule in an ideal gas is :-
(1) $v_{av} > v_{mp} > v_{rms}$ (2) $v_{rms} > v_{mp} > v_{av}$
(3) $v_{mp} > v_{rms} > v_{av}$ (4) $v_{rms} > v_{av} > v_{mp}$
21. A balloon of volume 20 m^3 is filled with helium. It rises to a height of 180 m in 30sec starting from rest. The mass of balloon and equipment (excluding payload and helium) is 12 kg. If density of air is 1.29 kg/m^3 and density of helium is 0.18 kg/m^3 and are constant, find the mass of payload lifted by the balloon :-
(1) 7.5 kg (2) 8 kg (3) 8.8 kg (4) 9.2 kg

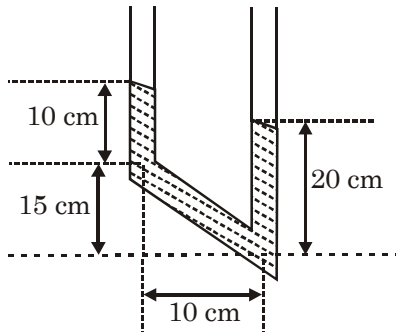
22. A lead bullet flying with a velocity of 100 m/s pierces a fixed board after which its velocity becomes 60 m/s. If 40% of energy lost increases the temperature of bullet, find change in its temperature. Specific heat capacity of lead = 125 J/kg K :-
(1) $10.2 \text{ }^\circ\text{C}$ (2) $6.3 \text{ }^\circ\text{C}$ (3) $12.1 \text{ }^\circ\text{C}$ (4) $0.2 \text{ }^\circ\text{C}$
23. A projectile is to be projected on a level ground. Its speed of projection remains fixed at u , but the angle of projection θ with horizontal can change from 0° to 90° . Plot range on the level ground against θ :-



24. Two parallel long wires of length 100 m each are separated by a distance of 40 cm from each other. The current in each of them is 200 A. The current flows in the same direction. The force acting between the two wires is :-
(1) 2N repulsive (2) 2N attractive
(3) 0.02 N repulsive (4) 0.02 N attractive

SPACE FOR ROUGH WORK

25. A U tube filled with a liquid is accelerating horizontally with an acceleration a . The acceleration of the tube is :-

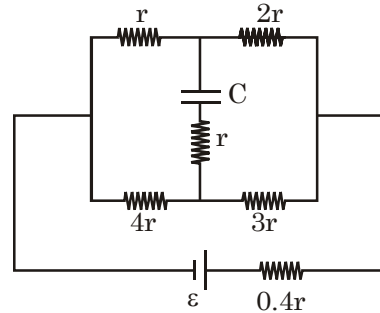


- (1) 5 m/s^2 (2) 10 m/s^2
 (3) 15 m/s^2 (4) 20 m/s^2
26. A real object is at a distance of 1m from its virtual image formed by a diverging lens. Determine the focal length of the lens if magnification is 0.6 :-
- (1) -3.25 m (2) -2.5 m
 (3) -3.75 m (4) -1.25 m
27. An electron flying in vacuum into a uniform magnetic field of $B = 128\pi \times 10^{-4} \text{ T}$ at a right angle to the magnetic field moves in a circle of radius $R = 2 \text{ cm}$. The potential difference which accelerated the electron before it enters the magnetic field is V . Find V . Take $m_e = 9.1 \times 10^{-31} \text{ kg}$ & $e = 1.6 \times 10^{-19} \text{ C}$:-
- (1) 14 kV (2) 25 kV
 (3) 78 kV (4) 57.6 kV

28. The resistance of a galvanometer is normally measured using :

- (1) Post office box
 (2) Potentiometer
 (3) Half deflection method
 (4) Meter bridge

29. Find the steady state charge on the capacitor :-

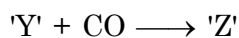
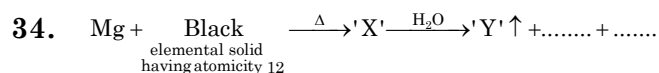


- (1) $0.2 C\epsilon$ (2) $0.4 C\epsilon$
 (3) $0.1 C\epsilon$ (4) $0.45 C\epsilon$
30. A ground receiver station receives signal at 80 MHz, transmitted from a ground transmitter at a height of 300 m located at a distance of 100 km from it. This signal could have come via :-
- (1) ground wave propagation.
 (2) sky wave propagation.
 (3) space wave propagation using satellite.
 (4) space wave propagation using LOS communication.

SPACE FOR ROUGH WORK

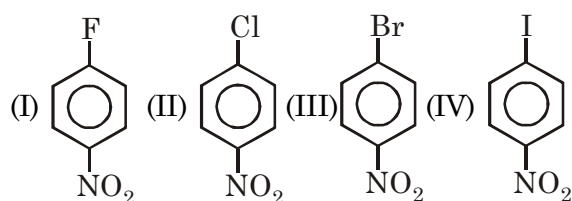
PART B - CHEMISTRY

31. 2 mole of an ideal gas at 27°C expands isothermally and reversibly from a volume of 4 litre to 40 litre. The work done (in kJ) by the gas is ($R = 8 \text{ J/mol K}$; $\ln 10 = 2.3$)
- (1) 28.72 kJ (2) 11.04 kJ
(3) 5.73 kJ (4) 4.988 kJ
32. An amount of 5 mol $\text{H}_2\text{O}(l)$ at 100°C and 1 atm is converted into $\text{H}_2\text{O}(g)$ at 100°C and 5 atm. ΔG for the process is -
- (1) zero (2) $1865 \times (\ln 5)$ cal
(3) $3730 \times (\ln 5)$ cal (4) $-3730 \times (\ln 5)$ cal
33. Choose the **CORRECT** option for the following statements.
- (i) Spring reaction is used for the preparation of sodium thiosulphite.
- (ii) $\text{SO}_2 + \text{C} \xrightarrow{\Delta} \text{A} + \text{B}$, where SO_2 acts as reducing agent.
- (iii) H_2SO_4 is better dehydrating agent than P_2O_5 .
- (iv) $\text{SO}_2(g) + \frac{1}{2}\text{O}_2(g) \longrightarrow \text{SO}_3(g)$
- $\Delta H = (+)\text{ve}$
- (1) TTFT (2) TFFT
(3) FFFF (4) TFFF



which of the following statement is **CORRECT**?

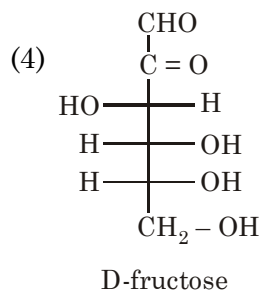
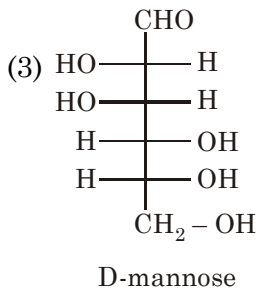
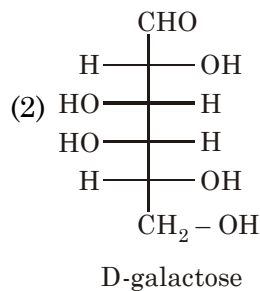
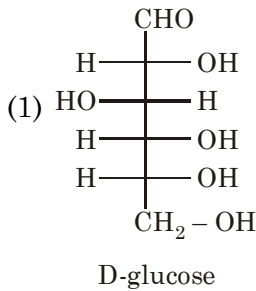
- (1) Maximum number of atoms are lying in one plane is 4 for 'Z'.
- (2) Y has no electron deficiency.
- (3) 'X' is a covalent compound.
- (4) Y has eight 2c-2e bond.
35. What is the **CORRECT** order of reactivity of the following compounds in aromatic nucleophilic substitution reactions when treated with aq. NaOH?



- (1) I > II > III > IV
(2) IV > III > II > I
(3) II > III > I > IV
(4) IV > II > I > III

SPACE FOR ROUGH WORK

36. Which of the following will give different osazone than the other three ?



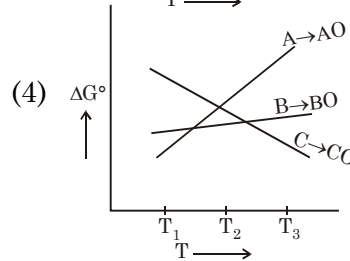
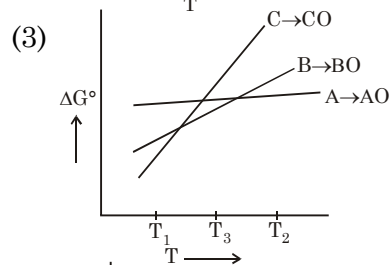
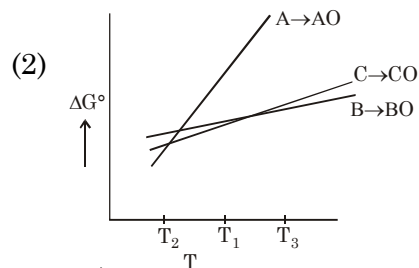
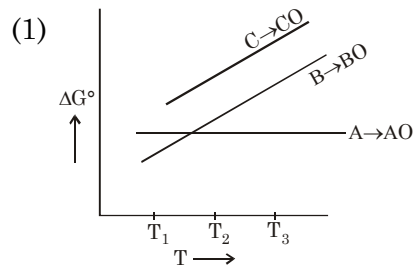
37. When $(\text{NH}_2\text{CH}_2\text{COOH} \cdot \text{HCl})$ is treated with NaOH , pH at first half equivalence point is 2.4 and the pH at second half equivalence point is 9.6. The pH at first equivalence point is -

- (1) 2.4 (2) 9.6
(3) 6 (4) 7.2



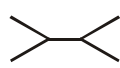

38. Lyophobic colloids are -

- (1) Reversible (2) irreversible
(3) water loving (4) solvent loving

39. Which of the following Ellingham diagram ensures that at temperature T_3 , A can reduce CO, B can reduce AO, and B can reduce CO but 'A' cannot reduce BO (where A, B and C are three unknown element).



SPACE FOR ROUGH WORK

40. $Ma_3b_3 \xrightarrow{-a/+b} Ma_2b_4$
 which of the isomer of reactant compound will produce two isomer of the product?
 (1) Facial (2) Meridional
 (3) Both (4) None
41. Which of the following will give compound with fruity order when treated with acetic acid in presence of Conc. H_2SO_4 ?
 (1) CH_3CH_2-OH (2) $HCOOH$
 (3) CH_3CHO (4) $CH_3-C(=O)-CH_3$
42. Which of the following is a non-narcotic analgesic?
 (1) Morphine (2) Heroin
 (3) Aspirin (4) Codeine
43. The rate constant, Arrhenius constant (pre-exponential factor) of the chemical reaction and the activation energy of a chemical reaction at $25^\circ C$ are $4 \times 10^{-4} \text{ sec}^{-1}$, $16 \times 10^{14} \text{ sec}^{-1}$ and 200 kJ/mol respectively. The value of rate constant at $T \rightarrow \infty$ is.
 (1) $2 \times 10^{18} \text{ sec}^{-1}$
 (2) $16 \times 10^{14} \text{ sec}^{-1}$
 (3) Infinity
 (4) $4 \times 10^{-4} \text{ sec}^{-1}$
44. Two liquids A and B have, P_A^0 and $P_B^0 = 1 : 3$ at a certain temperature. Assume A and B form an ideal solution, and the ratio of mole of A to B in the liquid phase are $1 : 3$, then mole fraction of A in vapour phase in equilibrium with the solution -
 (1) 0.1 (2) 0.2
 (3) 0.5 (4) 1.0
45. In which of the following cases back bonding direction is from central (underlined> atom to surrounding atom.
 (1) $[(CN)_3\underline{C}]^-$ (2) $:\underline{C}Cl_2$
 (3) $\underline{B}(NH_2)_3$ (4) $\underline{N}F_3$
46. Choose the incorrect order for the property indicated in the given options.
 (1) $N_2^+ > N^+$: E. A. order
 (2) $N > NO > O$: I.E. order
 (3) $K > Ga$: E. A. order
 (4) $Sn > P$: E.A. order
47. Which one of the following will produce optically active monohalogen derivative
 (1)  (2) 
 (3)  (4) 

SPACE FOR ROUGH WORK

48. Which of the following can produce 2° alcohol when treated with suitable RMgX followed by NH₄Cl?

- (1) $\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$ (2) $\text{CH}_3\text{CH}_2-\text{OH}$
 (3) O_2 (4) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$

49. The value of Λ_m^∞ for HCl, NaCl and CH₃COONa are 426.1, 126.5 and 91 Scm²mol⁻¹ respectively. Calculate the value of Λ_m^∞ for acetic acid -

- (1) 390.6 Scm²mol⁻¹ (2) 195.3 Scm²mol⁻¹
 (3) 35.5 Scm²mol⁻¹ (4) 336.1 Scm²mol⁻¹

50. When anion leaves the normal lattice site and electron occupies interstitial sites in its crystal lattice, the defect generated is called -

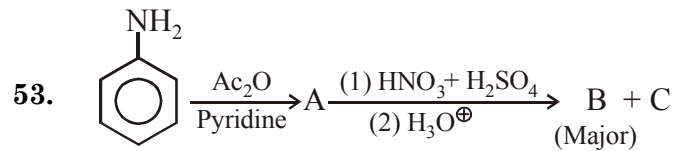
- (1) Schottky defect
 (2) Frenkel defect
 (3) Metal excess defect
 (4) Stoichiometric defect

51. If Pauli exclusion principle allows three electron in an orbital, and other rules are remaining same then find the block number of Co (Z = 27)

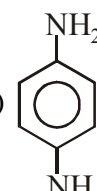
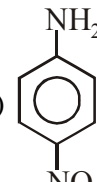
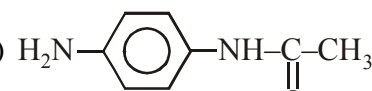
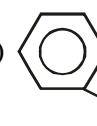
- (1) d (2) p
 (3) s (4) can't be predicted

52. When chromite ore is heated with Na₂CO₃ strongly followed by cooling and washing with water, then brown residue obtained which is of

- (1) Fe₂O₃ (2) Fe₂O₃.FeO
 (3) Na₂CrO₄ (4) FeO.Cr₂O₃

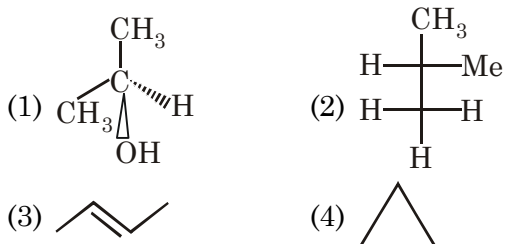


B is :

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

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54. Which of the following compounds will show stereoisomerism :



55. The concentration of CH_3COO^- in a solution prepared by adding 0.1 mole of $\text{CH}_3\text{COOAg}(s)$ in 1 litre of 0.1 M - HCl solution is-(Given: $K_a(\text{CH}_3\text{COOH}) = 10^{-5}\text{M}$; $K_{sp}(\text{AgCl}) = 10^{-10}\text{M}^2$;

$$K_{sp}(\text{CH}_3\text{COOAg}) = 10^{-8}\text{M}^2$$

(1) 10^{-3}M (2) 10^{-2}M (3) 10^{-1}M (4) 1M

56. Given the following bond enthalpies :

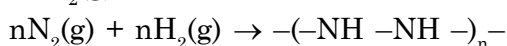
$$\text{B.E.}(\text{N} \equiv \text{N}) = 942 \text{ kJ/mol} ;$$

$$\text{BE}(\text{H}-\text{H}) = 436 \text{ kJ/mol}$$

$$\text{BE}(\text{N}-\text{N}) = 163 \text{ kJ/mol},$$

$$\text{BE}(\text{N}-\text{H}) = 390 \text{ kJ/mole}.$$

Determine enthalpy change for the following polymerisation reaction per mole of $\text{N}_2(\text{g})$ consumed -



(1) 272 kJ (2) 136 kJ (3) 435 kJ (4) 200 kJ

57. Highly polluted water could have BOD value of :-

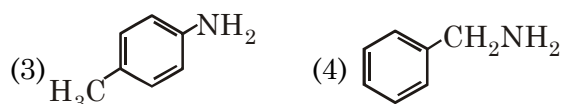
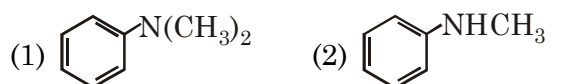
(1) 5 ppm (2) ≈ 0 ppm
(3) less than 7 ppm (4) 17 ppm or more

58. In portland cement, which of the following compounds are mainly present.

(I) Dicalcium silicate. (II) Tricalcium silicate
(III) Tricalcium aluminate

(1) (I) only (2) (II) and (III) only
(3) (I) and (III) only (4) (I), (II) and (III)

59. Amongst the compounds given, the one that would form a brilliant coloured dye on treatment with NaNO_2 in dil. HCl followed by addition to an alkaline solution of β -naphthol is -



60.

Polymer	Monomer
A. Nylon-6	P. Acrylo nitrile
B. Natural Rubber	Q. Glucose
C. Starch	R. Caprolactum
D. Orlon	S. Isoprene

Select **CORRECT** option?

	A	B	C	D
(1)	P	Q	R	S
(2)	Q	P	S	R
(3)	R	S	Q	P
(4)	S	R	P	Q

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PART C - MATHEMATICS

61. The integral $\int \frac{(\sin 2x + \cos^2 x) dx}{1 + \sin^2 x(\sin 2x - \cos^2 x)}$ is equal to
 (1) $\tan^{-1}(\tan^2 x - \tan x) + c$
 (2) $\tan^{-1}(\tan^2 x + \tan x) + c$
 (3) $\cot^{-1}(\tan^2 x - \tan x) + c$
 (4) $\cot^{-1}(\tan^2 x + \tan x) + c$
 (Where c is constant of integration)
62. The locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = \alpha x + \beta$ is a tangent to the ellipse $2x^2 + y^2 = b^2$, is
 (1) a hyperbola (2) a parabola
 (3) an ellipse (4) a circle
63. Let a, b, c, d be non-zero numbers. If point of intersection of $6ax + 2ay + c = 0$ and $5bx + 3by + d = 0$ lies in second quadrant such that its distance from x -axis is twice its distance from y -axis then
 (1) $7bc + 10ad = 0$ (2) $bc + 2ad = 0$
 (3) $7ad + 10bc = 0$ (4) $bc - 2ad = 0$
64. If $\vec{a} = -\hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} + \hat{k}$, then find z -component of a vector \vec{r} which is coplanar with \vec{a} and \vec{b} , $\vec{r} \cdot \vec{b} = 0$ and $\vec{r} \cdot \vec{a} = 7$.
 (1) 0 (2) 3 (3) 6 (4) $\frac{5}{2}$
65. Let $-\frac{\pi}{4} < \theta < -\frac{\pi}{6}$ suppose α_1 and β_1 are roots of the equation $x^2 + 2x \operatorname{cosec} \theta + 1 = 0$ and α_2 and β_2 are roots of the equation $x^2 + 2x \cot \theta - 1 = 0$. If $\alpha_1 < \beta_1$ and $\alpha_2 > \beta_2$ then $\alpha_1 + \beta_2$ equals
 (1) $-2 \cot \theta$ (2) $-2 \operatorname{cosec} \theta$
 (3) 0 (4) none of these
66. If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = x - [x] + \frac{1}{4}$, where $[x]$ is the greatest integer not exceeding x , then $\left\{x \in \mathbb{R} : f(x) = \frac{1}{4}\right\}$ is equal to
 (1) \mathbb{Q} , the set of all rational numbers
 (2) \mathbb{N} , the set of all natural numbers
 (3) \mathbb{N}_0 , the set of all whole numbers
 (4) \mathbb{Z} , the set of all integers
67. If $(1 - y)^{35}(1 + y)^{45} = A_0 + A_1 y + A_2 y^2 + A_3 y^3 + \dots + A_{80} y^{80}$, then
 (1) $\frac{A_2}{A_1} > 2$ (2) $A_1 = A_2$
 (3) $\frac{A_2}{A_1} < 1$ (4) $1 < \frac{A_2}{A_1} < 2$

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68. Three numbers whose sum is 18 are in A.P. If they are added by 6, $\frac{9}{2}$ and 3 respectively, then they are in G.P. Then sum of square of numbers is
- (1) $\frac{379}{4}$ (2) $\frac{445}{4}$
 (3) $\frac{225}{2}$ (4) $\frac{99}{2}$
69. Find the standard deviation of 10 observations 111, 211, 311,, 1011.
- (1) $100\sqrt{3}$ (2) 250
 (3) 300 (4) $50\sqrt{33}$
70. A vertical lamp-post of height 10 m stands at the corner of a rectangular field. The angle of elevation of its top from the farthest corner is 30° , while from one of the other two corners it is 45° . The area of the field is
- (1) $100\sqrt{2} \text{ m}^2$ (2) $10\sqrt{2} \text{ m}^2$
 (3) $100\sqrt{3} \text{ m}^2$ (4) $10\sqrt{3} \text{ m}^2$
71. The number of subsets R of $P = \{1, 2, 3, \dots, 9\}$ which satisfies the property. "There exist integers $a < b < c$ with $a \in R, b \notin R, c \in R$ " is
- (1) 512 (2) 466
 (3) 467 (4) None of these
72. A committee of 6 is to be chosen from 10 men and 7 women so as to contain at least 3 men and 2 women. The number of different ways in which this can be done if two particular women refuse to serve on the same committee
- (1) is less than 7000
 (2) lies between 7000 and 8000
 (3) lies between 8000 and 9000
 (4) is more than 9000
73. If a particle moves along a line by $S = \sqrt{1+t}$ then its acceleration is proportional to _____ of its velocity at any instant 't'
- (1) Square (2) Cube
 (3) Double (4) Triple
74. The value of $\lim_{x \rightarrow 0} \frac{1 - \cos(1 - \cos 2x)}{x^4}$ is
- (1) 4 (2) 2 (3) 1 (4) $\frac{1}{2}$
75. The value of $\int_0^2 \frac{dx}{2^{2x} + 4}$ is
- (1) $\frac{1}{4}$ (2) $\frac{1}{2}$ (3) 2 (4) 1

SPACE FOR ROUGH WORK

76. A bag contain 5 blue and 7 green balls. A balls is drawn at random from the bag, its colour is observed and this ball along with three additional balls of same colour and one additional ball of other colour are returned to the bag. If now a ball is drawn at random from the bag, then probability that this ball is blue, is
- (1) $\frac{55}{96}$ (2) $\frac{25}{48}$
 (3) $\frac{17}{24}$ (4) $\frac{41}{96}$
77. Find the length of a line segment whose length of projections on coordinate planes are 1, 2 and 2
- (1) $\frac{3}{\sqrt{2}}$ (2) $3\sqrt{2}$
 (3) 3 (4) 6
78. If A, B, C are angle of a triangle ABC and $\tan A \tan C = 3$; $\tan B \tan C = 6$; then which of the following is **incorrect** ?
- (1) $A = \frac{\pi}{4}$ (2) $\tan A \tan B = 2$
 (3) $\frac{\tan A}{\tan C} = 3$ (4) $\tan B = 2 \tan A$
79. Distance of point A(1, 2) measured parallel to the line $3x - y = 10$ from the line $x + y + 5 = 0$, is
- (1) $2\sqrt{5}$ (2) $2\sqrt{10}$
 (3) $4\sqrt{5}$ (4) $4\sqrt{10}$
80. Let A be the sum of the first 20 terms and B be the sum of the first 40 terms of the series $1^3 + 2.2^3 + 3^3 + 2.4^3 + 5^3 + 2.6^3 + \dots$. If $B - 2A = 600\lambda$, then λ is equal to -
- (1) 1281 (2) 1381
 (3) 1024 (4) 1481
81. If $f(x) = \sin^{-1}x$ and
- $$\lim_{x \rightarrow \frac{1}{2}^+} f(3x - 4x^3) = a - 3 \lim_{x \rightarrow \frac{1}{2}^+} f(x)$$
- the find [a]
 where [a] is the greatest integer not exceeding a
- (1) 1 (2) 0 (3) 3 (4) 2
82. If S, S_1, S_2 be the circles of radii 5, 3, 2 respectively. If S_1 and S_2 touch externally and they touch internally with S. The radius of circle S_3 which touches externally with S_1 and S_2 and internally with S is
- (1) $\frac{30}{19}$ (2) $\frac{12}{7}$
 (3) $\frac{5}{4}$ (4) can't be determined

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83. If set of real numbers is an universal set and set $A = \{t \in \mathbb{R} : f(x) = (x-1)|x^2 - 3x + 2| + \sin|x-1|, \text{ is differentiable at } x=t\}$, then $n(\bar{A})$ is equal to (where $n(B)$ denotes number of elements in set B)
- (1) 0 (2) 1 (3) 2 (4) 3
84. If $A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ and $\phi(x) = (1+x)(1-x)^{-1}$ then find $\phi(A)$
- (1) A (2) -A (3) A^2 (4) A^{-1}
85. $\sim(p \rightarrow \sim q)$ is equivalent to
- (1) $\sim p \wedge \sim q$ (2) $\sim p \wedge q$
 (3) $p \wedge q$ (4) None of these
86. Two sets P and Q are as under
 $P = \{(a,b) \in \mathbb{R} \times \mathbb{R} : |a-5| < 1 \text{ and } |b-5| < 1\}$
 $Q = \{(a,b) \in \mathbb{R} \times \mathbb{R} : 4a^2 + 9b^2 - 48a - 90b + 330 = 0\}$
- (1) $P \cap Q = \phi$ (an empty set)
 (2) $P \cap Q$ is singleton set
 (3) $P \subset Q$
 (4) $Q \subset P$
87. If system of equation $2x - y + z = 0$, $x - 2y + z = 0$ and $2\lambda x - y + 2z = 0$ has infinite many solution, then λ is equal to-
- (1) 5 (2) $\frac{5}{2}$ (3) $-\frac{3}{2}$ (4) -6
88. Let $y = y(x)$ be the solution of the differential equation $(1-x^2)\frac{dy}{dx} - xy = 1$, $x \in (-1, 1)$. If $y(0) = 0$, then $y\left(\frac{1}{2}\right)$ is equal to
- (1) $\frac{\pi}{3\sqrt{3}}$ (2) $\frac{\pi}{\sqrt{3}}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{3}$
89. Let $L_1 : \vec{r} = (\hat{i} + \hat{j} + \hat{k}) + \lambda(\hat{i} + \hat{j}), \lambda \in \mathbb{R}$
 $L_2 : \hat{i} + (\mu + 1)\hat{j} + (\mu + 1)\hat{k}, \mu \in \mathbb{R}$
 are two lines intersecting at point 'A'. Through point B(3, 3, 1) a line is drawn making an angle of 60° with L_2 and intersecting it at point 'C'. Then area of ΔABC is
- (1) $2\sqrt{2}$ (2) $3\sqrt{2}$
 (3) $2\sqrt{3}$ (4) $3\sqrt{3}$
90. If area bounded by curve $y = \left| \cos^{-1}(\sin x) \right| + \left| \frac{\pi}{2} - \cos^{-1}(\cos x) \right|$, x-axis and $\frac{\pi}{2} \leq x \leq \pi$ is equal to $\frac{\pi^2}{k}$ (where $k \in \mathbb{I}$), then k is
- (1) 12 (2) 8 (3) 4 (4) 2

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Note :

On 03-01-2019 (Thursday) JEE Main FULL SYLLABUS Test is introduced for Both Enthusiast and Leader Course.

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