



Class - XI

Date 20 – 09 – 2009

Duration : 3 Hours

Max. Marks : 240

PAPER - II

INSTRUCTIONS

A. Question paper format:

1. The question paper consists of 3 parts (Chemistry, Mathematics and Physics). Each part has 4 sections.
2. **Section I** contains 4 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **only one is correct**.
3. **Section II** contains 5 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **one or more is/are correct**.
4. **Section III** contains 2 questions. Each question has four statements (A, B, C and D) given in column I and five statements (p, q, r, s and t) in Column II. Any given statement in Column I can have correct matching with **one or more statement(s)** given in Column II. For example, if for a given question, statement B matches with the statements given in q and r, then for that particular question, against statement B, darken the bubbles corresponding to q and r in the ORS.
5. **Section IV** contains 8 subjective questions.

B. Marking scheme:

6. For each question in **Section I** you will be **awarded 3 marks** if you darken the bubble corresponding to the correct answer and **zero mark** if no bubbles is darkened. In case of bubbling of incorrect answer, **minus one (-1) mark** will be awarded.
7. For each question in **Section II**, you will be **awarded 4 marks** if you darken the bubble(s) corresponding to the correct choice(s) for the answer, and **zero mark** if no bubble is darkened. In all other cases, **Minus one (-1) mark** will be awarded.
8. For each question in **Section III**, you will be **awarded 2 marks** for **each row** in which you have darkened the bubble(s) corresponding to the correct answer. Thus, each question in this section carries a maximum of **8 marks**. There is **no negative marking** for incorrect answer(s) for this section.
9. For each question in **Section IV**, you will be **awarded 4 marks** if you darken the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In all other cases, **minus one (-1) mark** will be awarded.

Useful Data

1)	Gravitational Constant	G	=	$6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$
2)	Universal Gas Constant	R	=	$8.31 \text{ Jmol}^{-1}\text{K}^{-1}$
3)	Boltzmann's Constant	k	=	$1.38 \times 10^{-23} \text{ JK}^{-1}$
4)	Stefan's Constant	σ	=	$5.67 \times 10^{-8} \text{ W/m}^2 \text{ K}^4$
5)	Velocity of light in vacuum	c	=	$3 \times 10^8 \text{ m/s}$
6)	Planck's Constant	h	=	$6.63 \times 10^{-34} \text{ J s}$
7)	Rydberg Constant	R_∞	=	$1.097 \times 10^7 \text{ m}^{-1}$
8)	Atomic mass unit	u	=	931 MeV
9)	One electron volt	1eV	=	$1.6 \times 10^{-19} \text{ J}$
10)	Mass of electron	m_e	=	$0.00055 \text{ u} = 9.1 \times 10^{-31} \text{ kg}$
11)	Charge of an electron	e	=	$1.6 \times 10^{-19} \text{ C}$
12)	Mass of proton	m_p	=	$1.67 \times 10^{-27} \text{ kg}$
13)	Mass of neutron	m_n	=	1.00866 u
14)	Wein's constant	b	=	0.29 cm K.
15)	Permittivity of free space	ϵ_0	=	$8.8 \times 10^{-12} \text{ F/m}$
16)	permeability of free space	μ_0	=	$4\pi \times 10^{-7} \text{ H/m}$
17)	Universal Gas Constant	R	=	$8.31 \text{ Jmol}^{-1}\text{K}^{-1}$ or 0.0821 lit atm mol ⁻¹ K
18)	Boltzmann's Constant	k	=	$1.38 \times 10^{-23} \text{ JK}^{-1}$
19)	Velocity of light in vacuum	c	=	$3 \times 10^8 \text{ m/s}$
20)	Planck's Constant	h	=	$6.63 \times 10^{-34} \text{ J s}$
21)	Rydberg Constant	R_∞	=	$1.097 \times 10^7 \text{ m}^{-1}$
22)	Atomic mass unit	u	=	931 MeV
23)	One electron volt	1eV	=	$1.6 \times 10^{-19} \text{ J}$
24)	Mass of electron	m_e	=	$0.00055 \text{ u} = 9.1 \times 10^{-31} \text{ kg}$
25)	Atomic mass	Mg	=	24
26)	----- " " -----	Fe	=	56
27)	----- " " -----	F	=	31
28)	----- " " -----	C	=	12
29)	----- " " -----	Li	=	7
30)	----- " " -----	O	=	16
31)	----- " " -----	Al	=	27
32)	----- " " -----	Cu	=	63.5
33)	----- " " -----	Mn	=	55
34)	----- " " -----	Ag	=	108
35)	----- " " -----	Cr	=	52
36)	----- " " -----	K	=	39

MATHEMATICS

SECTION - I

Straight Objective Type

This section contains 4 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), for its answer, out of which **ONLY ONE** is correct.

1. The sum of all the positive integers greater than 1 and less than 1000, which leave a remainder of one when divided by 2, 3, 4, 5 and 6, is
 (A) 8176 (B) 7936 (C) 8167 (D) none
2. If the roots of the equation, $\frac{1}{x+p} + \frac{1}{x+q} = \frac{1}{r}$ are equal in magnitude but opposite in sign then $p + q$ is equal to :
 (A) r (B) $2r$ (C) $\frac{1}{2}r$ (D) none of these
3. If a, b, c, d & p are distinct real numbers such that ;
 $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) \leq 0$ then a, b, c, d are in :
 (A) AP (B) GP (C) HP (D) satisfy $ab = cd$
4. The sum of the series $(1^2 + 1).1! + (2^2 + 1).2! + (3^2 + 1).3! + \dots + (n^2 + 1).n!$ is :
 (A) $(n+1).(n+2)!$ (B) $n.(n+1)!$ (C) $(n+1).(n+1)!$ (D) none of these

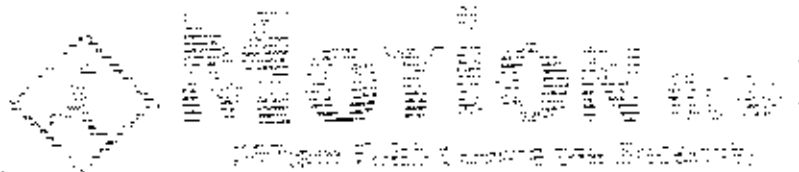
SECTION - II

Multiple Correct Answer Type

This section contains 5 multiple correct answer(s) type questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE** is/are correct.

5. If S_n denotes the sum of first n terms of an Arithmetic progression and a_n denotes the n^{th} term of the same A.P. Given $S_n = n^2p$; $S_k = k^2p$; where $k, p, n \in \mathbb{N}$ and $k \neq n$ then
 (A) $a_1 = p$ (B) common difference = $2p$
 (C) $S_p = p^3$ (D) $a_p = 2p^2 - p$
6. If d, e, f are in G.P. and the two quadratic equations,
 $ax^2 + 2bx + c = 0$ & $dx^2 + 2ex + f = 0$ have a common root, then :
 (A) $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in H.P. (B) $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in G.P.
 (C) $2dbf = aef + cde$ (D) $b^2df = ace^2$

(SPACE FOR ROUGH WORK)



7. If x, y, z are positive real numbers, such that $x + y + z = a$, then

(A) $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \geq \frac{9}{a}$

(B) $(a-x)(a-y)(a-z) \geq 8xyz$

(C) $(a-x)(a-y)(a-z) \leq \frac{8}{27} a^3$

(D) none of these

8. If $\sin^2 \beta = \sin \alpha \cos \alpha$, then $\cos 2\beta$ has the value equal to :

(A) $1 + \sin 2\alpha$

(B) $2 \sin^2\left(\frac{\pi}{4} - \alpha\right)$

(C) $1 - \sin 2\alpha$

(D) $2 \cos^2\left(\frac{\pi}{4} + \alpha\right)$

9. If $x = \sec \phi - \tan \phi$ & $y = \operatorname{cosec} \phi + \cot \phi$ then :

(A) $x = \frac{y+1}{y-1}$

(B) $y = \frac{1+x}{1-x}$

(C) $x = \frac{y-1}{y+1}$

(D) $xy + x - y + 1 = 0$

SECTION - III

Matrix-Match Type

This section contains 2 questions. Each question contains statements given in two columns which have to be matched. The statements in **Column I** are labelled A, B, C and D, while the statements in **Column II** are labelled p, q, r, s and t. Any given statement in **Column I** can have correct matching with **One OR More** statement(s) in **Column II**. The appropriate bubbles corresponding to the answers to these questions have to be darkened as illustrated in the following example. If the correct matches are A-p, s and t; B-q and r; C-p and q; and D-s and t; then the correct darkening of bubbles will look like the following.

	p	q	r	s	t
A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(SPACE FOR ROUGH WORK)



10. Column - I

(A) The harmonic mean of the roots of the equation

$$(5 + \sqrt{2})x^2 - (4 + \sqrt{5})x + 8 + 2\sqrt{5} = 0 \text{ is}$$

(B) Let a_1, a_2, \dots, a_{10} be in A.P. and h_1, h_2, \dots, h_{10} be in H.P.If $a_1 = h_1 = 2$ & $a_{10} = h_{10} = 3$ then $a_4 h_7$ is(C) The number of integer values of m , for which the x coordinate of the point of intersection of the lines

$$3x + 4y = 9 \text{ and } y = mx + 1 \text{ is also an integer, is}$$

(D) Between 2 and 5 six geometric means are inserted. If their product can be expressed as $(10)^n$ then the value of n equals

Column - II

(P) 2

(Q) 3

(R) 4

(S) 6

11. Column - I

(A) If $\cos x = \frac{1 + 2\cos y}{2 + \cos y}$ then $\cot^2 \frac{x}{2} \tan^2 \frac{y}{2}$ is equal to(B) If α, β are the roots of $(x - 2)(x - 3) + c = 0$ then one of the roots of the equation $(1 + \alpha x)(1 + \beta x) = cx^2$ is(C) If $32 \tan^8 \theta = 2 \cos^2 \alpha - 3 \cos \alpha$ and $3 \cos 2\theta = 1$, then $\cos 2\alpha$ is(D) If a_1, a_2, a_3, a_4, a_5 are rational numbers in H.P.,

then one of the roots of the equation

$$a_1 a_5 x^2 + (a_1 a_2 + a_2 a_3 + \dots + a_4 a_5) x - 5a_1 a_5 = 0 \text{ is}$$

Column - II

(P) - 5

(Q) 1

(R) 3

(S) $\frac{1}{3}$ (T) $-\frac{1}{2}$

(SPACE FOR ROUGH WORK)

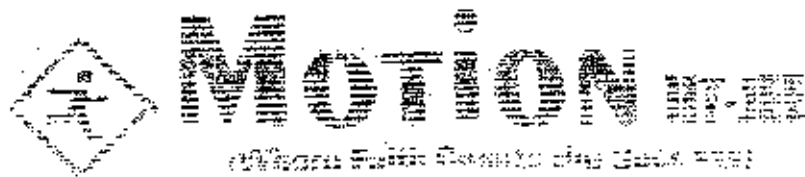


SECTION - IV

This section contains 8 subjective questions.

12. Let a, b, c, d be distinct integers such that the equation $(x - a)(x - b)(x - c)(x - d) - 9 = 0$ has an integer root r . Then the value of $a + b + c + d - 4r$ is
13. If 3 positive real numbers a, b, c are in A.P. with $abc = 4$, then the minimum value of $[b]$ is, where $[\cdot]$ represents the integral part
14. Two consecutive numbers from $1, 2, 3, \dots, n$ are removed. If the arithmetic mean of the remaining numbers is $\frac{105}{4}$ then $(n-45)$ is equal to
15. If $\cot(\theta - \alpha), 3 \cot\theta, \cot(\theta + \alpha)$ are in A.P., and θ is not an integral multiple of $\frac{\pi}{2}$, then $\frac{2 \sin^2 \theta}{\sin^2 \alpha}$ is equal to
16. If in the triangle ABC, $\tan \frac{A}{2}, \tan \frac{B}{2}$ and $\tan \frac{C}{2}$ are in harmonic progression then the least value of $\cot^2 \frac{B}{2}$ is equal to
17. If $a \tan \alpha + \sqrt{a^2 - 1} \tan \beta + \sqrt{a^2 + 1} \tan \gamma = 2a$, where a is constant and α, β, γ are variable angles. Then the least value of $3(\tan^2 \alpha + \tan^2 \beta + \tan^2 \gamma)$ is equal to
18. Given $\sum_{k=1}^{35} \sin 5k = \tan\left(\frac{m}{n}\right)$, where angles are measured in degrees, and m and n are relatively prime positive integers that satisfy $\frac{m}{n} < 90$, then the value of $\frac{mn}{50}$ is
19. If $\sin x, \sin^2 2x$ and $\cos x \cdot \sin 4x$ form an increasing geometric sequence, then square of the common ratio of geometric sequence is

(SPACE FOR ROUGH WORK)



PHYSICS

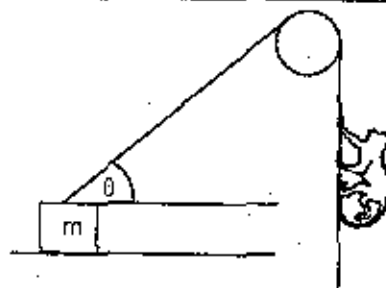
SECTION - I

Straight Objective Type

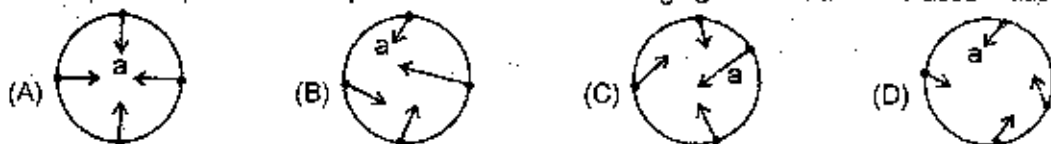
This section contains 4 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), for its answer, out of which **ONLY ONE** is correct.

20. A block of mass m rests on a table with rough surface of coefficient of friction μ with rope tied to it as shown. A monkey of same mass climbs at the free end of the rope. The maximum acceleration of the monkey for the block to be at rest is

- (A) g (B) $\frac{\mu g}{\cos\theta + \mu \sin\theta} - g$
 (C) $g - \mu g$ (D) $g + \frac{\mu g}{\tan\theta - \mu \sec\theta}$

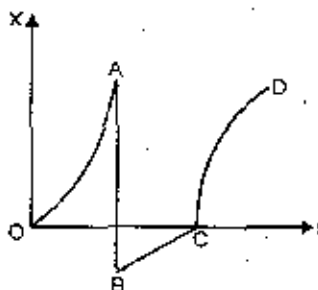


21. A car speeds up in a circular path. Which of the following figure illustrates the acceleration of the car?



22. The displacement-time ($x - t$) graph of a body is shown in fig. The body is accelerated along the path.

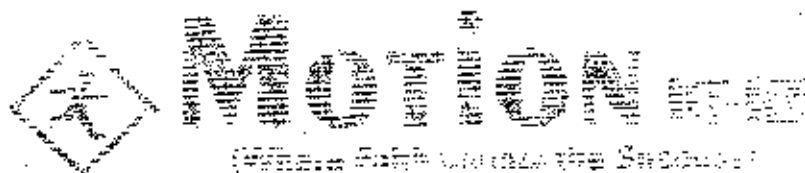
- (A) OA only (B) BC only
 (C) CD only (D) OA and CD both



23. A particle is executing uniform circular motion in a horizontal plane in clockwise direction. The change in its centripetal acceleration when it comes from east to west is due

- (A) North (B) South (C) East (D) West

(SPACE FOR ROUGH WORK)



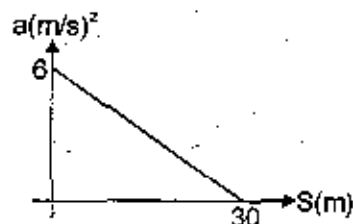
SECTION - II

Multiple Correct Answer Type

This section contains 5 multiple correct answer(s) type questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONE OR MORE is/are correct.

24. A train starts from rest at $S = 0$ and is subjected to acceleration as shown

- (A) Change in velocity at the end of 10 m displacement is 50 m/s.
 (B) Velocity of the train for $S = 10$ m is 10 m/s
 (C) The maximum velocity attained by train is not greater than 14 m/s
 (D) The maximum velocity of the train is between 15 m/s and 16 m/s



25. A lift of very broad-floor moving vertically upward is accelerating down with a constant acceleration 'g'. At an instant when its velocity is v_0 , a stone is projected from a point on the floor of the lift at an elevation θ . Then the trajectory of stone is

- (A) A parabola in the lift frame (B) A straight line in the lift frame
 (C) A parabola in the ground frame (D) A straight line in the ground frame.

26. The motion of a body is given by equation $\frac{dv(t)}{dt} = 6.0 - 3v(t)$, where $v(t)$ is speed in m/s and t in second. If the body were at rest at $t = 0$, then

- (A) the terminal speed is 2.0 m/s
 (B) the speed varies with time as $v(t) = 2(1 - e^{-3t})$ m/s
 (C) the speed is 0.1 m/s when the acceleration is half the initial value
 (D) the magnitude of the initial acceleration is 6.0 m/s²

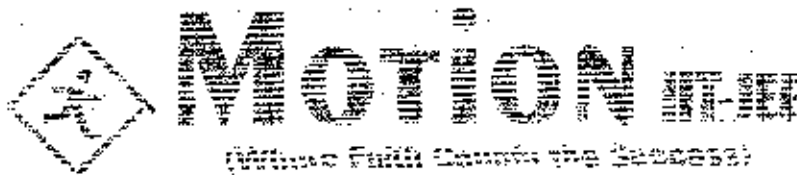
27. Mark the correct statements about the friction between two bodies.

- (A) Static friction is always greater than the kinetic friction.
 (B) Coefficient of static friction is always greater than the coefficient of kinetic friction.
 (C) Limiting friction is always greater than the kinetic friction.
 (D) Limiting friction is never less than static friction.

28. A particle is moving along a circular path. The angular velocity, linear velocity, angular acceleration and centripetal acceleration of the particle at any instant respectively are $\vec{\omega}$, \vec{v} , $\vec{\alpha}$ and \vec{a}_c . Which of the following relations is/are correct ?

- (A) $\vec{\omega} \cdot \vec{v} = 0$ (B) $\vec{\omega} \cdot \vec{\alpha} = 0$ (C) $\vec{\omega} \cdot \vec{a}_c = 0$ (D) $\vec{v} \cdot \vec{a}_c = 0$

(SPACE FOR ROUGH WORK)



SECTION - III

Matrix-Match Type

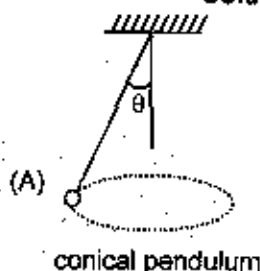
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	p	q	r	s	t
A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

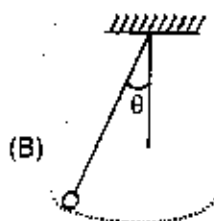
29. In all the four situations depicted in column I, a ball of mass m is connected to a string. In each case, find the tension in the string and match the appropriate entries in column II.

Column I

Column II



(P) $T = mg \cos \theta$

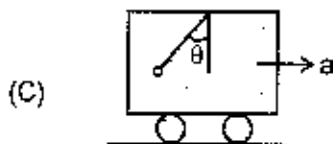


(Q) $T \cos \theta = mg$

Pendulum is swinging. angular position θ is the extreme position T is tension in extreme position

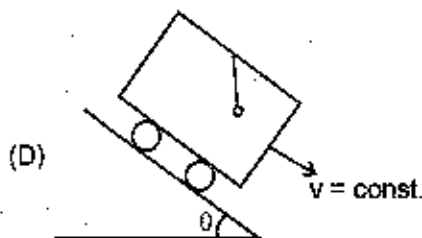
(SPACE FOR ROUGH WORK)





(R) Speed of ball with respect to ground is constant

The car is moving with constant acceleration
The ball is at rest with respect to car.



(S) Velocity of ball with respect to ground is changing continuously

The car is moving with constant velocity.
The ball is at rest with respect to car.

30.

Column-I

Column-II

- (A) If swimmer can swim at 5m/sec in still water and velocity of water flow is 4m/sec then angle between direction of swimming and direction of river flow to minimize drift.
- (B) If swimmer can swim at 5m/sec in still water and velocity of flow is 3m/sec then angle between direction of velocity of swimmer with respect to river and the direction of river flow if swimmer crosses the river in minimum time.
- (C) If swimmer can swim at 4m/sec and velocity of flow is 3m/sec then angle of resultant velocity (w.r.t ground) with the direction of river flow if swimmer swims perpendicular to flow of river
- (D) Angle between direction of fluttering of flag and north if wind blows towards south west direction with a velocity $3\sqrt{2}$ m/sec. Man moves with a velocity 7m/sec along west, holding flag in his hand.

(P) 53° (Q) 127° (R) 143° (S) 90°

(SPACE FOR ROUGH WORK)



Motion IIT-JEE

Whose Faith Create the Success



MOTION IIT-JEE
Where Faith Counts the Success

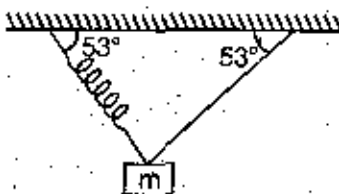
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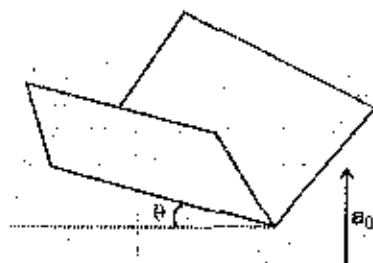
SECTION - IV

This section contains 8 subjective questions.

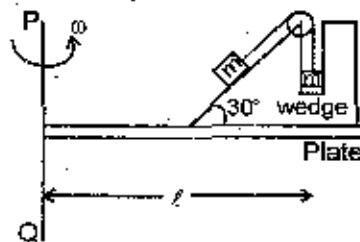
31. A block is attached with an ideal spring and string and is in equilibrium as shown in figure. The acceleration of the block just after breaking the string is a_1 and just after breaking the spring is a_2 . Then $\frac{a_1}{a_2}$ will be



32. A passenger reaches the platform and finds that the second last boggy of the train is passing him. The second last boggy takes 3s to pass the passenger, and the last boggy takes 2s to pass him. How late in the milliseconds is the passenger for the departure of the train? Assume that the train accelerates at constant rate and all the boggies are of equal length.
33. Figure shows a 90° trough which is inclined at angle θ with the horizontal. The trough is moving upward with acceleration a_0 . A cube is placed in the trough. Calculate minimum coefficient of friction required between trough and block surfaces so that the block can remain stationary relative to the trough.



34. A gun is situated on an inclined plane. The maximum range up the inclined plane and down the inclined plane are 250 m and 750 m respectively. Find the angle of inclination (in degree) of the inclined plane.
35. A wedge is fixed on a moving square plate with angular velocity $\omega = \sqrt{g/l}$ and side of the plate is l . The coefficient of friction between the block and the wedge such that there is no relative motion. (Assume that side of plate is very large as compare to width and height of wedge.)

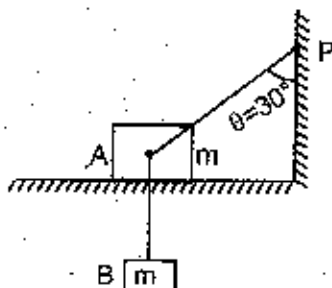


(SPACE FOR ROUGH WORK)

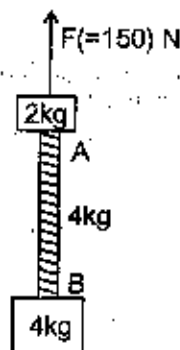
MOTION
 (Where Truth Glazes the Senses)



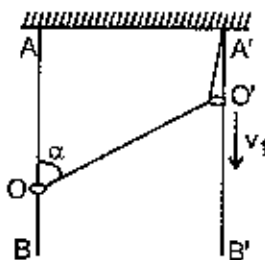
36. Block A is on a frictionless horizontal table. A massless inextensible string fixed at one end passes over a smooth nail fixed with the block A. The other end of the string is connected to block B of mass m . Initially the block B is held at rest so that $\theta = 30^\circ$. What will be the magnitude of acceleration of block B just after it is released (in m/s^2 , take $g = 10 \text{ m/s}^2$)



37. Consider the shown arrangement where two blocks are connected by a uniform rope of mass 4 kg being lifted up vertically by an vertical upward force of 150 N magnitude. The ratio of tension in the rope at A to that at B would be



38. Two rings O and O' are put on two vertical stationary rods AB and A'B' respectively. An inextensible thread is fixed at point A' and on ring O and is passed through ring O' (figure shown)



Assuming that ring O' moves downwards at a constant velocity v_1 , determine velocity v_2 of the ring O. If $\angle AOO' = \alpha$.

(SPACE FOR ROUGH WORK)



CHEMISTRY

SECTION - I

Straight Objective Type

This section contains 4 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), for its answer, out of which **ONLY ONE** is correct.

39. If the mole fraction of a solute is changed from $\frac{1}{3}$ to $\frac{1}{2}$ in the 800 g of solvent then the ratio of molality will be :
 (A) 1 : 3 (B) 3 : 1 (C) 4 : 3 (D) 1 : 2
40. 120 gm Mg was burnt in air to give a mixture of MgO and Mg_3N_2 . The mixture is now dissolved in HCl to form $MgCl_2$ and NH_4Cl , if 107 grams NH_4Cl is produced. The reaction are follows

$$Mg + \frac{1}{2}O_2 \longrightarrow MgO \qquad 3Mg + N_2 \longrightarrow Mg_3N_2$$

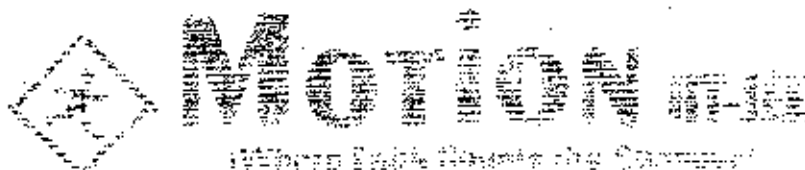
$$MgO + 2HCl \longrightarrow MgCl_2 + H_2O \qquad Mg_3N_2 + 8HCl \longrightarrow 2NH_4Cl + 3MgCl_2$$
 Then the moles of $MgCl_2$ formed is :
 (A) 3 moles (B) 6 moles (C) 5 moles (D) 10 moles
41. Amongst H_2O , H_2S , H_2Se , H_2Te , the one with highest boiling point is
 (A) H_2O because of H-bonding (B) H_2Te because of higher molecular mass
 (C) H_2S because of H-bonding (D) H_2Se because of lower molecular mass
42. The time taken for a certain volume of a gas 'X' to diffuse through a small hole is 2 minutes. It takes 5.65 minutes for oxygen to diffuse under the similar conditions. The molecular weight of 'X' is
 (A) 8 (B) 4 (C) 16 (D) 32

SECTION - II

Multiple Correct Answer Type

This section contains 5 multiple correct answer(s) type questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE** is/are correct.

(SPACE FOR ROUGH WORK)



43. The vapour density of a mixture containing NO_2 and N_2O_4 is 38.3 at 27°C . Which of the following is/are correct for 100 moles of mixture ?
 (A) Moles of NO_2 in mixture is 33.48 (B) Moles of N_2O_4 in mixture is 66.52
 (C) Weight of NO_2 in mixture is 1540 g (D) Weight of N_2O_4 in mixture is 1540 g
44. 100 ml of mixture of CO and CO_2 is mixed with 30 ml of oxygen and sparked in edimeter. The residual gas after treatment with aq. KOH was 10 ml which remains unchanged when treated with alkaline pyrogalol. Which of the following is/are correct ?
 (A) The volume of CO_2 absorbed by KOH is 90 ml
 (B) The volume of CO initially present was 70 ml
 (C) The volume of CO initially present was 50 ml
 (D) The volume of CO_2 absorbed by KOH is 80 ml
45. Which of the statement is correct ?
 (A) In PCl_5 hybridisation is sp^3d and it has trigonal bipyramidal structure
 (B) The angle between the P and Cl is 90° which is same for all the P and Cl present in PCl_5
 (C) The bond length of P – Cl in axial position is higher than in equatorial position
 (D) PCl_5 is ionic in solid phase.
46. Which of the following is/are correct :
 (A) Basicity of $\text{H}_2\text{S}_2\text{O}_5$ is 2 (B) Basicity of $\text{H}_2\text{S}_2\text{O}_8$ is 2
 (C) In $\text{H}_2\text{S}_2\text{O}_8$ peroxide linkage is present (D) In CrO_5 only one peroxide linkage is present
47. Which of the following is/are correct :
 (A) $\text{H}_3\text{P}_3\text{O}_{12}$ is a dibasic acid (B) $\text{H}_5\text{P}_3\text{O}_7$ is a tetrabasic acid
 (C) $\text{H}_5\text{P}_3\text{O}_{10}$ has 9 P – O bonds (D) All are correct

SECTION - III

Matrix-Match Type

This section contains 2 questions. Each question contains statements given in two columns which have to be matched. The statements in **Column I** are labelled A, B, C and D, while the statements in **Column II** are labelled p, q, r, s and t. Any given statement in **Column I** can have correct matching with **One OR More** statement(s) in **Column II**. The appropriate bubbles corresponding to the answers to these questions have to be darkened as illustrated in the following example if the correct matches are A-p, s and t; B-q and r; C-p and q and D-s and t; then the correct darkening of bubbles will look like the following.

(SPACE FOR ROUGH WORK)



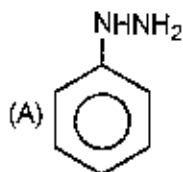
	p	q	r	s	t	u
A	●	q	r	●	●	●
B	p	●	●	s	t	u
C	●	●	r	s	t	●
D	p	q	r	●	●	u

Match the following

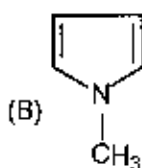
48.

Column I

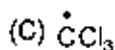
Column II



(P) sp^2



(Q) sp^3



(R) Polar



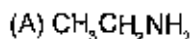
(S) Non-polar

(T) delocalisation of electron.

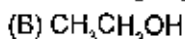
49. Match the following :

Column - I (Molecules)

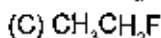
Column-II (Properties)



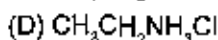
(P) A Lewis base



(Q) Forms H-bond



(R) Has the most polar covalent bond



(S) Has both covalent and ionic bonds.

(SPACE FOR ROUGH WORK)



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SECTION – IV

This section contains 8 subjective questions.

50. Equal volumes of 2M AgNO_3 solution and 1.0 M NaCl solution are mixed. In the resulting solution, molarity of Ag^+ is $\frac{1}{x}$. Assuming AgCl to be insoluble, value of x is
51. An oleum sample is labelled as $(100 + x)\%$ and it contain $\frac{80}{3}\%$ free SO_3 by weight. Hence, x is
52. 4.3 g of a saturated hydrocarbon ($\text{C}_n\text{H}_{2n+2}$) is burnt completely and all CO_2 were absorbed in aqueous NaOH solution. A 300 mL 2 N NaOH solution was required. Hence, value of "n" is
53. A 50.00 ft long classroom has twenty rows of seats and the adjacent rows are separated by 2.5 ft each. A N_2O cylinder on the front door and a CH_4 cylinder on the rear door were opened simultaneously, so that gases start diffusing into the classroom. Student of which row will first experience the teased laughing ? Assume both the cylinders have gases at same temperature and pressure and valves have similar dimensions.
54. A sample of chalk contained as impurity a form of clay which loses 14.5% of its weight of water on prolong heating. 5g of chalk on heating shows a loss in weight (due to evolution of CO_2 and water) by 1.507 g. Calculate % of chalk in the sample.
55. A sample of coal gas contains 50% H_2 , 30% CH_4 , 14% CO and 6% C_2H_4 . 100mL of coal gas is mixed with 150 mL of O_2 and the mixture is exploded. What will be the volume composition of mixture when cooled to original conditions?
56. A mixture of ethane (C_2H_6) and ethene (C_2H_4) occupies 40 litre at 1.00 atm and at 400K. The mixture reacts completely with 130 g of O_2 to produce CO_2 and H_2O . Assuming ideal gas behaviour, calculate the mole fraction of C_2H_4 and C_2H_6 in the mixture.
57. 10 mL of a mixture of CH_4 , C_2H_2 and CO_2 was exploded with excess of air. After explosion there was a contraction of 17 mL and after treatment with KOH , there was a further reduction of 14 mL. What was the composition of the mixture?

(SPACE FOR ROUGH WORK)



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