

# FIITJEE INTERNAL TEST

## PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 101077

RIT-5

Time Allotted: 3 Hours

Maximum Marks: 180

- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
- You are not allowed to leave the Examination Hall before the end of the test.

### INSTRUCTIONS

**Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.**

#### A. General Instructions

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains **Three Sections**.
3. **Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
4. All the section can be filled in **PART-A & B** of OMR.
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

#### B. Filling of OMR Sheet

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with **Blue/Black Ball Point Pen** for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.

#### C. Marking Scheme For All Two Parts.

- (i) **Part-A (01-04)** – Contains Four (04) multiple choice questions which have ONLY ONE CORRECT answer. Each question carries **+3 marks** for correct answer and **-1 marks** for wrong answer.
- (ii) **PART-A (05–07)** contains (3) Multiple Choice Questions which have One or More Than One Correct answer.  
*Full Marks: +4* If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.  
*Partial Marks: +1* For darkening a bubble corresponding to **each correct option**, provided NO incorrect option is darkened.  
*Zero Marks: 0* If none of the bubbles is darkened.  
**Negative Marks: -1 In all other cases.**  
For example, if (A), (C) and (D) are all the correct options for a question, darkening all these three will result in **+4 marks**; darkening only (A) and (D) will result in **+2 marks**; and darkening (A) and (B) will result in **-1 marks**, as a wrong option is also darkened.
- (iii) **Part-A (08-10)** – This section contains Three (03) Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question. Each question carries **+4 Marks** for correct answer and **-1 marks** for wrong answer.
- (iii) **Part-B** – This section contains **SIX (06)** questions numerical based questions. The answer to each question is a **NUMERICAL VALUE**. If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places. Each question carries **+4 marks** for correct answer. **There is no negative marking.**

Name of the Candidate: \_\_\_\_\_

Batch: \_\_\_\_\_ Date of Examination: \_\_\_\_\_

Enrolment Number: \_\_\_\_\_

BATCHES – Class – XII (CTY426 Batches)

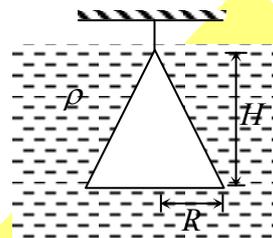
## **SECTION – I: PHYSICS**

### (PART – A)

(Single Correct Answer Type)

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

1. A solid cone of height  $H$ , radius  $R$  suspended by a string is just submerged in a liquid of density  $\rho$  such that tension in string is zero as shown in the figure. The magnitude of the net force applied by the liquid on the curved surface of the cone is equal to (atmospheric pressure is  $P_0$ )



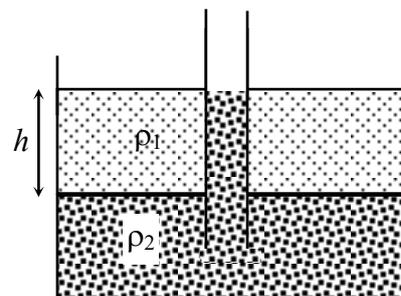
- (A)  $\frac{\pi R^2}{3}(2P_0 + \rho gH)$                       (B)  $\frac{\pi R^3}{3}(2P_0 + \rho gH)$   
 (C)  $\frac{\pi R^2}{3}(3P_0 + 2\rho gH)$                       (D)  $\frac{\pi R^3}{3}(3P_0 + 2\rho gH)$

2. A string of length  $l$  is elongated by  $\frac{l}{30}$ , the time taken by the transverse wave to cover the string is  $t_1$ . If the string is elongated by a distance  $\frac{l}{20}$ , the time taken by the transverse wave to cover the string is  $t_2$ . Then,  $\frac{t_1}{t_2} =$

(Assume that the string obey's Hook's law and neglect change in area of crosssection of string)

- (A)  $\frac{4}{3}$                       (B)  $\frac{4}{\sqrt{3}}$                       (C)  $\frac{4}{3\sqrt{3}}$                       (D)  $\sqrt{\frac{3}{2}}$

3. A container has two immiscible liquids of densities  $\rho_1$  and  $\rho_2 (> \rho_1)$ . A capillary tube of radius  $r$  is inserted in the liquid so that its bottom reaches upto the denser liquid. The denser liquid rises in the capillary and attains a height  $h$  from the interface of the liquids, which is equal to the column length of the lighter liquid. Assuming angle of contact to be zero, the surface tension of heavier liquid is



- (A)  $2\pi r \rho_2 g h$                       (B)  $\frac{\rho_2 r g h}{2}$                       (C)  $\frac{r}{2}(\rho_2 - \rho_1) g h$                       (D)  $2\pi r (\rho_2 - \rho_1) g h$

Space For Rough Work

4. A source of sound of single frequency  $v_0$  flies along a straight line which is at a finite distance from the observer. Then the observer hears
- (A) a frequency  $v_0$  at the instant when the source is nearest to him.  
 (B) a frequency greater than  $v_0$  at the instant when the source is nearest to him.  
 (C) a frequency  $v_0$  at an instant later than the instant of nearest position of the source.  
 (D) during the fly past, the increase in frequency is not equal to the decrease in the frequency.

**(One or More Than One Options Correct Type)**

This section contains **3 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE** is correct.

5. Two waves travelling in opposite directions produce a standing wave. The individual wave functions are given by  $y_1 = 4 \sin(3x - 2t)$  and  $y_2 = 4 \sin(3x + 2t)$  cm, where  $x$  and  $y$  are in cm
- (A) The maximum displacement of the motion at  $x = \frac{3\pi}{4}$  cm is 4 cm.  
 (B) The maximum displacement of the motion at  $t = \frac{\pi}{6}$  sec is  $4\sqrt{2}$  cm.  
 (C) Nodes are formed at  $x$  values given by  $0, \pi/3, 2\pi/3, \pi, 4\pi/3, \dots$   
 (D) Antinodes are formed at  $x$  values given by  $\pi/6, \pi/2, 5\pi/6, 7\pi/6, \dots$
6. An object is floating in a liquid, kept in a container. The container is placed in a lift. Choose the correct option(s)
- (A) Buoyant force increases as lift accelerates up.  
 (B) Buoyant force decreases as lift accelerates up.  
 (C) Buoyant force remains constant as lift accelerates.  
 (D) The fraction of solid submerged into liquid does not change.
7. A vibrating string produces 2 beats per seconds when sounded with a tuning fork of frequency 256 Hz. increasing the tension in the string produces 3 beats per second. The initial frequency of the string may have been
- (A) 253 Hz                      (B) 254 Hz                      (C) 258 Hz                      (D) 259 Hz

**(Matching List Sets)**

This section contains **Three (03) Matching List Sets**. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

8. The first overtone of an open organ pipe A and a closed pipe B have the same frequency at a given temperature. It follows that the ratio of the

List-I		List-II	
(P)	Length of A and B is	(1)	10 : 9
(Q)	Fundamental frequencies of A & B is	(2)	3 : 2
(R)	First overtone of A to third harmonic of B is	(3)	9 : 10
(S)	Time period of first overtone of A & B is	(4)	4 : 3
		(5)	None of these

The correct option is:

- (A)  $P \rightarrow 4$  ;  $Q \rightarrow 2$  ;  $R \rightarrow 5$  ;  $S \rightarrow 3$                       (B)  $P \rightarrow 2$  ;  $Q \rightarrow 5$  ;  $R \rightarrow 4$  ;  $S \rightarrow 3$   
 (C)  $P \rightarrow 4$  ;  $Q \rightarrow 2$  ;  $R \rightarrow 3$  ;  $S \rightarrow 1$                       (D)  $P \rightarrow 4$  ;  $Q \rightarrow 2$  ;  $R \rightarrow 1$  ;  $S \rightarrow 5$

*Space For Rough Work*

9. Assume all the liquid drop or air bubble have surface tension  $T$  and radius  $R$ .

List-I		List-II	
(P)	Excess pressure of liquid drop in air is	(1)	$\frac{4T}{R} + \rho gh$
(Q)	Excess pressure of bubble in air is	(2)	$\frac{2T}{R} + \rho gh$
(R)	Excess pressure of air bubble in liquid at its free surface is	(3)	$\frac{4T}{R}$
(S)	Excess pressure of air bubble in liquid at depth $h$ from free surface is	(4)	$2\frac{T}{R}$
		(5)	$\frac{2T}{R} - \rho gh$

The correct option is:

- (A)  $P \rightarrow 3, Q \rightarrow 4, R \rightarrow 4, S \rightarrow 3$       (B)  $P \rightarrow 4, Q \rightarrow 3, R \rightarrow 4, S \rightarrow 4$   
 (C)  $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 5, S \rightarrow 4$       (D)  $P \rightarrow 3, Q \rightarrow 1, R \rightarrow 4, S \rightarrow 5$

10. Match the statements in List-I with statement in List-II.

List-I		List-II	
(P)	A tight string is fixed at both ends and sustaining standing wave	(1)	At the middle, antinodes is formed is odd harmonic
(Q)	A tight string is fixed at one end and free at the other end.	(2)	At the middle, node is formed in even harmonic
(R)	Standing wave is formed in an open organ pipe. End correction is not negligible	(3)	At the middle neither node nor antinodes is formed
(S)	Standing wave is formed in a closed pipe. End correction is not negligible	(4)	Phase difference between SHM of any two particles will be either zero or $\pi$

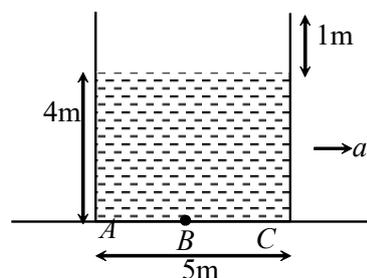
The correct option is:

- (A)  $P \rightarrow 1,2,3 ; Q \rightarrow 2,4 ; R \rightarrow 1 ; S \rightarrow 3,4$       (B)  $P \rightarrow 1,2,4 ; Q \rightarrow 3,4 ; R \rightarrow 3 ; S \rightarrow 2,4$   
 (C)  $P \rightarrow 1,2,4 ; Q \rightarrow 3,4 ; R \rightarrow 4 ; S \rightarrow 3,4$       (D)  $P \rightarrow 2,3,4 ; Q \rightarrow 1,4 ; R \rightarrow 2 ; S \rightarrow 2,4$

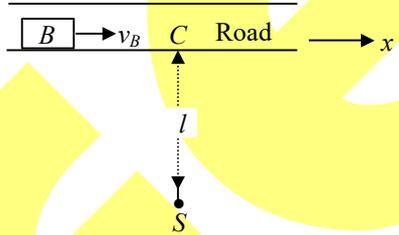
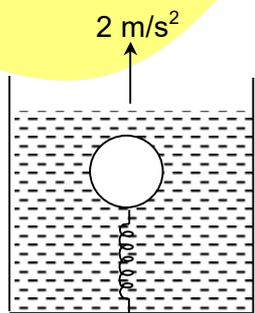
### (PART - B)

This section contains **SIX (06)** numerical based questions. The answer to each question is a NUMERICAL VALUE. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.

1. A cubical open vessel of side 5m filled with liquid upto a height of 4m is accelerated with an acceleration  $a$ . If the minimum value of  $a$  so that pressure at mid point of AC is equals to atmospheric then find the value of  $\frac{a}{g}$



Space For Rough Work

2. Sound waves of frequency 16 kHz are emitted by two coherent point sources of sound placed 2 m apart at the centre of a circular train track of large radius. A person riding the train observes 2 maxima per second when the train is running at a speed of 36 km/h. If the radius of the track is  $\frac{250x}{\pi}$  m, find the value of 'x'. (velocity of sound in air 320 m/s).
3. A 4.0 kg block is suspended from the ceiling of an elevator through a string having a linear mass density of  $19.2 \times 10^{-3}$  kg/m. The speed (with respect to the string) with which a wave pulse can proceed on the string if the elevator accelerates up at the rate of  $2.0 \text{ m/s}^2$  is 12.5 m. what is the value of n. Take  $g = 10 \text{ m/s}^2$ .
4. A bus B is moving with a velocity  $v_B$  in the positive x-direction along a road as shown in the figure. A shooter 'S' is at a distance  $l$  from the road. He has a detector which can detect signals only of frequency 1500 Hz. The bus blows horn of frequency 1000 Hz. When the detector detects a signal the shooter immediately shoots towards the road along SC and the bullet hits the bus. Find the value of 'n' if the velocity of the bullet is  $34n$  (velocity of sound in air is  $v = 340 \text{ m/s}$  and  $\frac{v_B}{v} = \frac{2}{3\sqrt{3}}$ )
- 
5. A ball of mass 10 kg and density  $1 \text{ gm/cm}^3$  is attached to the base of a container having a liquid of density  $1.1 \text{ gm/cm}^3$ , with the help of a spring as shown in the figure. The container is going up with an acceleration  $2 \text{ m/s}^2$ . If the spring constant of the spring is 200 N/m, then find the elongation (in cm) in the spring
- 
6.  $S_1$  and  $S_2$  are two loudspeakers with the same frequency of 165 Hz and their individual intensity at P is  $1.6 \times 10^{-3}$  and  $2.5 \times 10^{-3} \text{ w/m}^2$  respectively. Where P is a point at a distance 4 m from  $S_1$  and 3m from  $S_2$ . If they vibrate in same phase the intensity at P when  $S_1$  and  $S_2$  both are on is  $\chi \times 10^{-4} \text{ w/m}^2$ . Find  $\chi$ . (take velocity of sound = 330 m/s).

Space For Rough Work

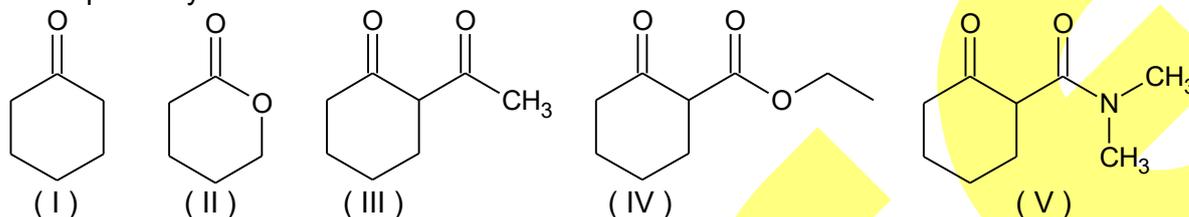
## SECTION – II: CHEMISTRY

### (PART – A)

(Single Correct Answer Type)

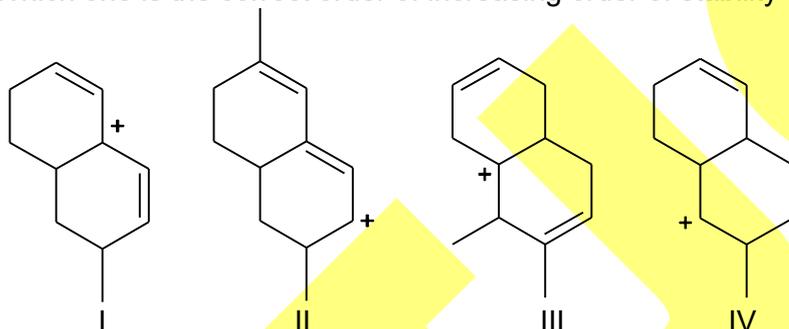
This section contains **4 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct**.

1. Out of the five compounds shown below, the compound which is most acidic and least acidic are respectively.



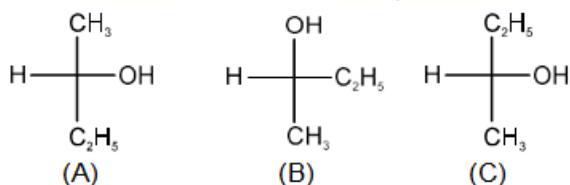
- (A) IV and I  
(B) III and I  
(C) III and II  
(D) V and II

2. Which one is the correct order of increasing order of stability of carbocations shown below?



- (A) I < II < III < IV  
(B) IV < I < III < II  
(C) IV < II < I < III  
(D) IV < III < I < II

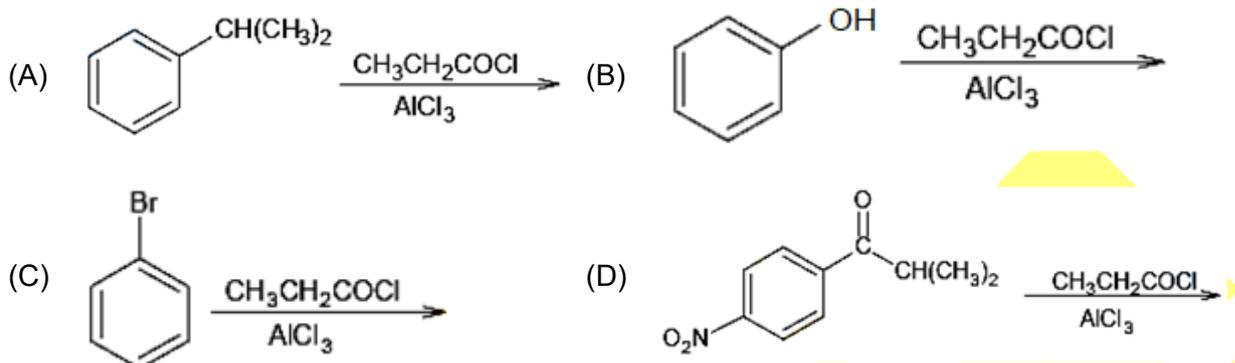
3. The correct statement/s about compounds A, B and C is/are :



- (A) 'A' and 'B' are enantiomers  
(B) 'B' and 'C' are diastereomer  
(C) 'A' and 'C' are enantiomers  
(D) 'A' and 'C' are diastereomers

Space For Rough Work

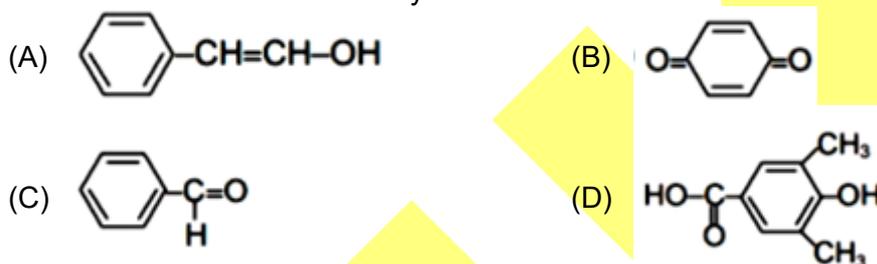
4. Which of the following reaction is least possible by Friedel-Craft acylation as per expectation?



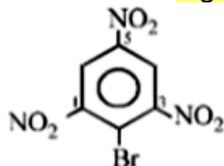
(One or More Than One Options Correct Type)

This section contains 3 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE** is correct.

5. Tautomerism is not exhibited by



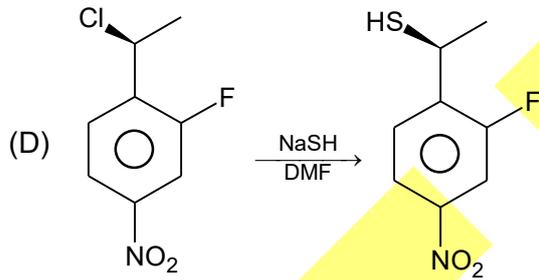
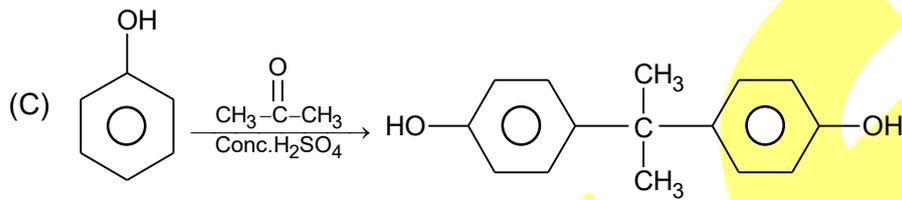
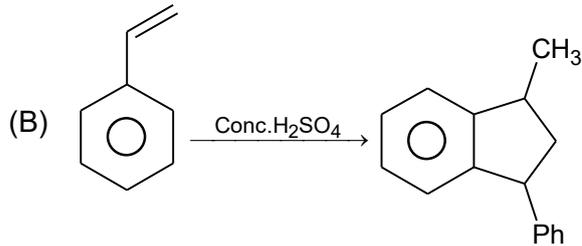
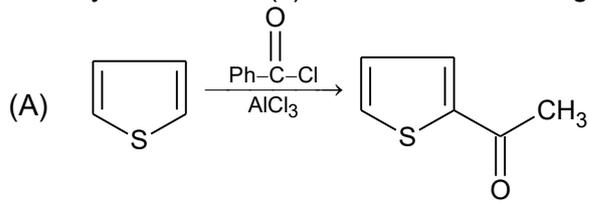
6. Which of the following statements would be false about this compound:



- (A) All three C – N bonds are of same length  
 (B) C1 – N and C3 – N bonds are of same length but shorter than C5 - N bond  
 (C) C1 – N and C3 – N bonds are of same length but longer than C5 - N bond  
 (D) C1 – N and C3 – N bonds are of different length but both are longer than C5 - N bond

Space For Rough Work

7. Identify the reaction(s) which is/are correct given:

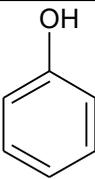
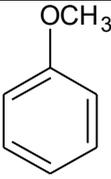
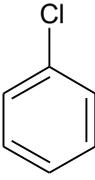
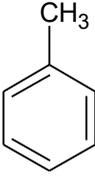


Space For Rough Work

**(Matching List Sets)**

This section contains **Three (03)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

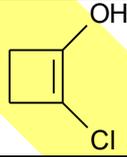
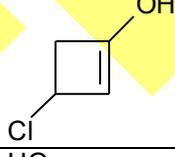
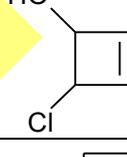
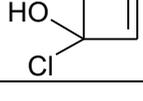
8. Match the following & answer accordingly:

List - I		List- II	
(P)		(1)	Less reactive than benzene towards electrophilic methylation
(Q)		(2)	Forms tri-substituted product with Br <sub>2</sub> in presence of water
(R)		(3)	Acidified permanganate oxidation forms benzoic acid
(S)		(4)	Reacts with HI
		(5)	Undergoes free-radical chlorination

The correct option is:

- (A) (P) → (1, 2), (Q) → (3, 4), (R) → (5), (S) → (2)  
 (B) (P) → (2), (Q) → (3, 4), (R) → (5), (S) → (3, 4)  
 (C) (P) → (2), (Q) → (4, 5), (R) → (1), (S) → (3, 5)  
 (D) (P) → (2, 3), (Q) → (4, 5), (R) → (1), (S) → (4)

9. Match the lists.

List - I		List- II	
(P)		(1)	Resonance stabilization in the compound
(Q)		(2)	IUPAC name is 2-chlorocyclobutenol
(R)		(3)	IUPAC name is 3- chlorocyclobutenol
(S)		(4)	Hyperconjugation is possible
		(5)	Aromatic compound

- (A) P → 1, 2, 4; Q → 1, 3, 4; R → 4; S → 4    (B) P → 4, 5; Q → 2; R → 2, 3, 5; S → 1, 2  
 (C) P → 2; Q → 4, 5; R → 1; S → 3, 4, 5    (D) P → 2, 5; Q → 3, 4; R → 1, 2, 3; S → 3

10. Match the reactions mentioned in list-I with their nature and nature of products mentioned in list-II.

List – I		List – II	
(P)	$\begin{array}{c} \text{H} \quad \text{CH}_3 \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H}_3\text{C} \quad \text{H} \end{array} + \text{Br}_2 \xrightarrow{\text{CCl}_4}$	(1)	Product is dl pair
(Q)	$\begin{array}{c} \text{H}_3\text{C} \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{CH}_3 \end{array} \xrightarrow{\text{HBr}}$	(2)	Product is meso
(R)	$\begin{array}{c} \text{H} \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H}_3\text{C} \quad \text{CH}_3 \end{array} \xrightarrow[\text{CCl}_4]{\text{Cl}_2}$	(3)	Cis addition takes place
(S)	$\begin{array}{c} \text{H} \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H}_3\text{C} \quad \text{CH}_3 \end{array} \xrightarrow[\text{Cold}]{\text{MnO}_4^-/\text{OH}^-}$	(4)	Trans addition takes place
		(5)	Product is not an optical isomer

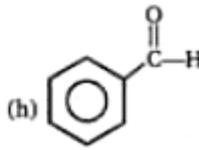
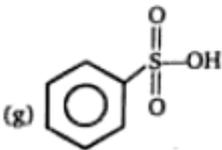
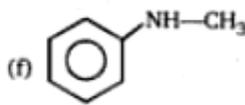
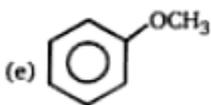
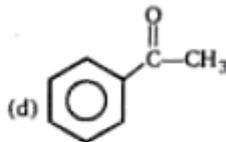
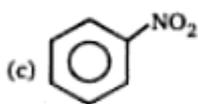
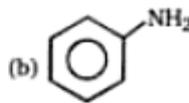
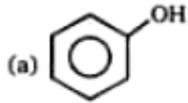
- (A) P → 2, 4; Q → 1; R → 1, 4; S → 2, 3  
 (B) P → 2, 4; Q → 1, 2; R → 2; S → 3, 4  
 (C) P → 3, 4; Q → 2, 3; R → 1, 4, 5; S → 1, 4  
 (D) P → 1, 5; Q → 3; R → 2, 3; S → 2, 5

Space For Rough Work

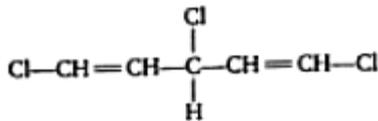
**(PART – B)**

This section contains **SIX (06)** numerical based questions. The answer to each question is a NUMERICAL VALUE. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.

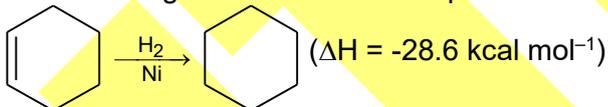
1.  $x$  = number of (+M) group attached with phenyl ring, so the value of  $x$  is



2. Find out the total number of stereoisomers of the given following compound.



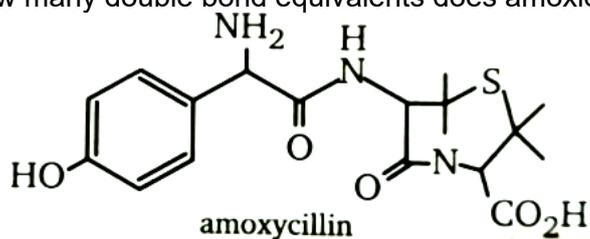
3. Use the following data to answer the question below.



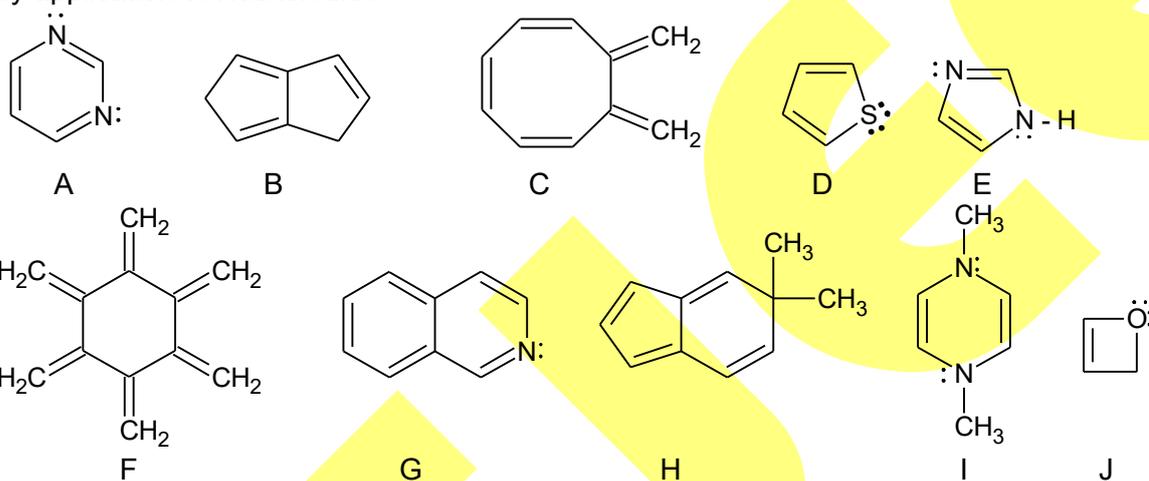
Calculate the resonance energy of anthracene.

Space For Rough Work

4. How many double bond equivalents does amoxicillin possess?



5. The conjugate base of cyclopent-1, 3-diene is aromatic ion. The negative charge on carbon is delocalized over how many carbon atoms?
6. How many of the following compounds (A through J), which would be considered aromatic by application of Huckel rule?



Space For Rough Work

## **SECTION – III: MATHEMATICS**

### **(PART – A)**

#### **(Single Correct Answer Type)**

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

1. Point 'O' is the centre of the ellipse with major axis AB and minor axis CD. Point F is one focus of the ellipse. If  $OF = 6$  and the diameter of the inscribed circle of triangle OCF is 2, then the product  $(AB)(CD)$  is equal to  
 (A) 52                      (B) 56                      (C) 78                      (D) None of these
2. Equation of a tangent passing through  $(2, 8)$  to the hyperbola  $5x^2 - y^2 = 5$  is  
 (A)  $3x - y + 2 = 0$                       (B)  $3x + y + 14 = 0$   
 (C)  $23x - 3y - 22 = 0$                       (D)  $3x - 23y + 178 = 0$
3. The transverse axis of a hyperbola is of length  $2a$  and a vertex divides the segment of the axis between the centre and the corresponding focus in the ratio 2:1, then the equation of the hyperbola is  
 (A)  $4x^2 - 5y^2 = 4a^2$                       (B)  $4x^2 - 5y^2 = 5a^2$   
 (C)  $5x^2 - 4y^2 = 4a^2$                       (D)  $5x^2 - 4y^2 = 5a^2$
4. Number of ways in which the letters of the word "NATION" can be filled in the given figure such that no row remains empty and each box contain not more than one letter in  $(K)6!$ . The value of K equals:  
 (A) 13                      (B) 12  
 (C) 11                      (D) 10


#### **(One or More Than One Options Correct Type)**

This section contains **3 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.

5. The points, where the normals to the ellipse  $x^2 + 3y^2 = 37$  be parallel to the line  $6x - 5y + 7 = 0$  is/are  
 (A)  $(5, 2)$                       (B)  $(2, 5)$                       (C)  $(1, 3)$                       (D)  $(-5, -2)$
6. Tangents are drawn from the points on a tangent of the hyperbola  $x^2 - y^2 = 4$  to the parabola  $y^2 = 8x$ . All chords of contact pass through a fixed point P. Locus of P is an ellipse  $E = 0$  whose director circle is  $C = 0$ .  
 (A)  $e = \frac{\sqrt{3}}{2}$                       (B)  $C = x^2 + y^2 - 20$   
 (C) directrices of E are  $x = \pm \frac{4}{\sqrt{3}}$                       (D) directrices of E are  $y = \pm \frac{4}{\sqrt{3}}$

*Space For Rough Work*

7. Which of the following statements are correct?
- (A) Number of words that can be formed with 6 only of the letters of the word "CENTRIFUGAL" if each word must contain all the vowels is  $3.7!$
- (B) There are 15 balls of which some are white and the rest black. If the number of ways in which the balls can be arranged in a row is maximum then the number of white balls must be equal to 7 or 8 Assume balls of the same colour to be alike.
- (C) There are 12 things 4 alike of one kind, 5 alike and of another kind and the rest are all different. The total number of combinations is 240.
- (D) Number of selections that can be made of 6 letters from the word COMMITTEE" is 35.

**(Matching List Sets)**

This section contains **Three (03)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

8. Match each entry in **List – I** to the correct entry in **List – II**.

	<b>List – I</b>		<b>List – II</b>
(P)	The value of $1.1! + 2.2! + 3.3! + \dots + n.n!$ , is	(1)	$(n+2)2^{n-1} - (n+1)$
(Q)	The value of $n \cdot {}^n C_1 + (n-1) \cdot {}^n C_2 + (n-2) \cdot {}^n C_3 + \dots + 1 \cdot {}^n C_n$ is	(2)	$2^n C_n$
(R)	${}^2 C_2 + {}^3 C_2 + {}^4 C_2 + \dots + {}^n C_2$	(3)	$(n+1)! - 1$
(S)	$\sum_{r=0}^n ({}^n C_r)^2$ is	(4)	${}^{n+1} C_3$
		(5)	$2^n C_{n-1} - 1$

The correct option is

- (A) P→(3) Q → (1) R→(4) S→(4)                      (B) P→(3) Q → (2) R→(5) S→(4)  
 (C) P→(2) Q → (1) R→(2) S→(5)                      (D) P→(2) Q → (2) R→(4) S→(1)
9. Match each entry in **List – I** to the correct entry in **List – II**.

	<b>List – I</b>		<b>List – II</b>
(P)	Number of integral values of b for which tangent parallel to line $y = x + 1$ can be drawn to hyperbola $\frac{x^2}{5} - \frac{y^2}{b^2} = 1$ is	(1)	16
(Q)	The equation of the hyperbola with vertices (3, 0) and (-3, 0) and semi – latusrectum 4, is given by is $4x^2 - 3y^2 = 4k$ , then k =	(2)	4
(R)	The product of the lengths of the perpendiculars from the two foci on any tangent to the hyperbola $\frac{x^2}{25} - \frac{y^2}{3} = 1$ is $\sqrt{k}$ , then k is	(3)	3
(S)	An equation of a tangent to the hyperbola, $16x^2 - 25y^2 - 96x + 100y - 356 = 0$ which makes an angle $\frac{\pi}{4}$ with the transverse axis is $y = x + \lambda$ , ( $\lambda > 0$ ), then $2\lambda$ is	(4)	9
		(5)	6

The correct option is

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

*Space For Rough Work*

10. Match each entry in **List – I** to the correct entry in **List – II**.

	<b>List – I</b>		<b>List – II</b>
(P)	A stick of length 10 meter slides on co – ordinate axes, then locus of a point dividing this stick reckoning from x – axis in the ratio 6 : 4 is a curve whose eccentricity is e, then 9e is	(1)	$\sqrt{6}$
(Q)	AA' is major axis of an ellipse $3x^2 + 2y^2 + 6x - 4y - 1 = 0$ and P is variable point on it then greatest value of area of a triangle APA' is	(2)	$2\sqrt{7}$
(R)	Distance between foci of the curve represented by the equation $x = 1 + 4\cos\theta, y = 2 + 3\sin\theta$ is	(3)	$\frac{128}{3}$
(S)	Tangents are drawn to the ellipse $\frac{x^2}{16} + \frac{y^2}{7} = 1$ at end points of latus rectum. The area of quadrilateral so formed is	(4)	$3\sqrt{5}$
		(5)	$5\sqrt{3}$

The correct option is

(A) P→(2) Q → (3) R→(1) S→(1)

(B) P→(2) Q → (4) R→(5) S→(2)

(C) P→(4) Q → (2) R→(2) S→(1)

(D) P→(4) Q → (1) R→(2) S→(3)

### (PART – B)

This section contains **SIX (06)** numerical based questions. The answer to each question is a NUMERICAL VALUE. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.

- If the eccentricities of hyperbola  $xy = c^2$  and  $x^2 - y^2 = a^2$  are  $e_1$  and  $e_2$ , then the value of  $200(e_1^4 + e_2^4)$  must be \_\_\_\_\_.
- If PSQ is a focal chord of the ellipse  $16x^2 + 25y^2 = 400$  such that  $SP = 8$ , then the length of SQ is \_\_\_\_\_.
- The slope of one of the common tangent to the hyperbola  $\left(\frac{x^2}{a^2}\right) - \left(\frac{y^2}{b^2}\right) = 1$  and  $\left(\frac{y^2}{a^2}\right) - \left(\frac{x^2}{b^2}\right) = 1$  is \_\_\_\_\_.
- A normal to the hyperbola  $\frac{x^2}{4} - \frac{y^2}{1} = 1$  has equal intercepts on positive x and y – axes. If this normal touches the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then  $[a^2 + b^2] = \underline{\hspace{2cm}}$  (where [.] = G.I.F).
- All the letters of the word 'EAMCET' are arranged in possible ways. The number of such arrangement in which no two vowels are adjacent to each other is:
- There are 10 girls and 8 boys in a class room including Mr. Ravi, Ms. Rani and Ms. Radha. A list of speakers consisting of 8 girls and 6 boys has to be prepared. Mr. Ravi refuses to speak if Ms Rani is a speaker. Ms. Rani refuses to speak if Ms. Radha is a speaker. The number of ways the list can be prepared is a 3 digit number  $n_1n_2n_3$ , then  $|n_3 + n_2 - n_1| =$

Space For Rough Work

# FIITJEE INTERNAL TEST

BATCHES – Class – XII (CTY426 Batches)

RIT – 5

Code: 101077

JEE ADVANCED LEVEL

ANSWER KEY

ANSWER KEYS

**Physics**

**PART – A**

- |       |       |       |      |
|-------|-------|-------|------|
| 1. C  | 2. D  | 3. C  | 4. A |
| 5. CD | 6. AD | 7. BC | 8. C |
| 9. B  | 10. C |       |      |

**PART – B**

- |      |      |      |      |
|------|------|------|------|
| 1. 2 | 2. 4 | 3. 4 | 4. 4 |
| 5. 6 | 6. 1 |      |      |

**Chemistry**

**PART – A**

- |       |        |        |      |
|-------|--------|--------|------|
| 1. C  | 2. D   | 3. C   | 4. D |
| 5. BC | 6. ABD | 7. ABC | 8. C |
| 9. A  | 10. A  |        |      |

**PART – B**

- |      |      |       |      |
|------|------|-------|------|
| 1. 4 | 2. 4 | 3. 84 | 4. 9 |
| 5. 5 | 6. 4 |       |      |

**Mathematics**

**PART – A**

- |       |        |        |      |
|-------|--------|--------|------|
| 1. D  | 2. C   | 3. D   | 4. A |
| 5. AD | 6. ABD | 7. ABD | 8. A |
| 9. B  | 10. D  |        |      |

**PART – B**

- |         |      |      |      |
|---------|------|------|------|
| 1. 1600 | 2. 2 | 3. 2 | 4. 8 |
| 5. 72   | 6. 5 |      |      |