

# FIITJEE - JEE (Main)

PHYSICS, CHEMISTRY & MATHEMATICS  
BATCHES: Two Year CRP(2224) B-lot  
PHASE TEST – III  
Q.P. CODE: 100189

Time Allotted: 3 Hours

Maximum Marks: 300

- Do not open this Test Booklet until you are asked to do so.
- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

## Important 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. Each **Section** is further divided into **Two Parts: Part-A & B** in the OMR.
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices ext. except the Admit Card inside the examination hall / room.

### 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.
4. **Do not fold or make any stray marks on the Answer Sheet.**

### C. Marking Scheme for All Two Parts:

- (i) **Part-A (01-20)** – Contains Twenty (20) multiple choice objective questions which have four (4) options each and only one correct option. Each question carries **+4 marks** which will be awarded for every correct answer and **-1 mark** will be deducted for every incorrect answer.
- (ii) **Part-B (01-05)** contains five (05) Numerical based questions, the answer of which maybe positive or negative numbers or decimals to **Two Places** (e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking**.

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

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

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

# Physics

## PART – A

### Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

- A mercury barometer reads 76 cm. What would it read if a small hole is made at the top of the barometer?  
(A) the reading will be zero  
(B) the reading will increase  
(C) the reading will decrease but will not become zero  
(D) none of these
- A cylindrical object floats in water such that  $\frac{3}{4}$ th of its volume is immersed in water. Its density is \_\_\_\_\_  $\text{kg m}^{-3}$ .  
(A) 250  
(B) 0.75  
(C) 0.25  
(D) 750
- During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio  $\frac{C_p}{C_v} = \gamma$  for the gas is  
(A) 2  
(B)  $\frac{3}{2}$   
(C)  $\frac{5}{3}$   
(D)  $\frac{4}{3}$
- Internal energy of  $n_1$  moles of hydrogen at temperature  $T$  is equal to internal energy of  $n_2$  moles of Helium at temperature  $2T$ . The ratio  $n_1 : n_2$  is  
(A)  $\frac{3}{5}$   
(B)  $\frac{2}{3}$   
(C)  $\frac{6}{5}$   
(D)  $\frac{3}{7}$
- Two wires made up of same material are of equal lengths but their radii are in the ratio 1 : 2. On stretching each of these two strings by the same tension the ratio between the fundamental frequencies is  
(A) 1 : 2  
(B) 2 : 1  
(C) 1 : 4  
(D) 4 : 1
- The  $C_p/C_v$  ratio for a gas mixture consisting of 4 gms helium and 32 gms of oxygen is  
(A) 1.45  
(B) 1.6  
(C) 1.5  
(D) 1.66
- Suppose there is a hole in a copper plate. Upon heating the plate, diameter of hole would  
(A) increases  
(B) decreases  
(C) remains the same  
(D) data insufficient

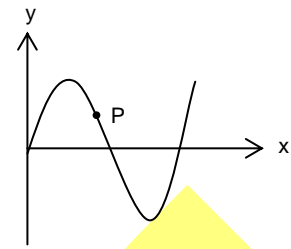
Space For Rough Work

8. A source of sound is moving towards a stationary observer with a speed of 50 m/s. The observer measures the frequency of the source as 1000 Hz. The speed of sound is 350 m/s. The apparent frequency measured by the observer when the source is moving away after crossing the observer is  
(A) 750 Hz (B) 850 Hz (C) 1150 Hz (D) 1250 Hz
9. The velocity of waves in a string fixed at both ends is 2 m/s. The string forms standing waves with nodes 5.0 cm apart. The frequency of vibration of the string is  
(A) 10 Hz (B) 20 Hz (C) 30 Hz (D) 40 Hz
10. A cylindrical tube, open at both ends, has a fundamental frequency  $f$  in air. The tube is dipped vertically in water so that half of it is in water. The fundamental frequency of the air column is now  
(A)  $f/2$  (B)  $3f/4$  (C)  $f$  (D)  $2f$
11. Hot water cools from  $60^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  in the first 10 min and to  $42^{\circ}\text{C}$  in the next 10 min. The temperature of the surrounding is  
(A)  $5^{\circ}\text{C}$  (B)  $10^{\circ}\text{C}$   
(C)  $15^{\circ}\text{C}$  (D)  $20^{\circ}\text{C}$
12. Two wires made up of same material are of equal lengths but their radii are in the ratio 2 : 1. On stretching each of these two strings by the same tension the ratio between the fundamental frequencies is  
(A) 1 : 2 (B) 2 : 1  
(C) 1 : 4 (D) 4 : 1
13. 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 cross-section of string)  
(A)  $\frac{4}{3}$  (B)  $\frac{4}{\sqrt{3}}$  (C)  $\frac{4}{3\sqrt{3}}$  (D)  $\sqrt{\frac{3}{2}}$

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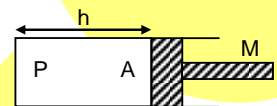
Space For Rough Work

14. A transverse sinusoidal wave moves along a string in the positive x-direction at a speed of 10 cm/s. The wavelength of the wave is 0.5 m and its amplitude is 10 cm. At a particular time  $t$ , the snap-shot of the wave is shown in figure. The velocity of point P when its displacement is 5 cm is



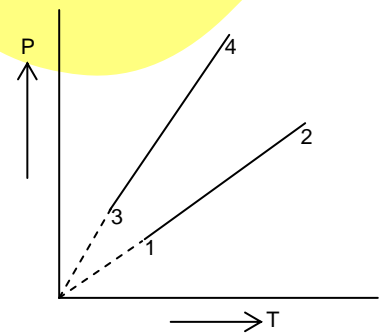
- (A)  $\frac{\sqrt{3}\pi}{50} \hat{j}$  m/s  
 (B)  $-\frac{\sqrt{3}\pi}{50} \hat{j}$  m/s  
 (C)  $\frac{\sqrt{3}\pi}{50} \hat{i}$  m/s  
 (D)  $-\frac{\sqrt{3}\pi}{50} \hat{i}$  m/s

15. A cylindrical piston of mass  $M$  slides smoothly inside a long cylinder closed at one end, enclosing a certain mass of a gas. The cylinder is kept with its axis horizontal. If the piston is slightly compressed isothermally from its equilibrium position, it oscillates simple harmonically, the period of oscillation will be



- (A)  $T = 2\pi\sqrt{\frac{Mh}{PA}}$   
 (B)  $T = 2\pi\sqrt{\frac{MA}{Ph}}$   
 (C)  $T = 2\pi\sqrt{\frac{M}{PAh}}$   
 (D)  $T = 2\pi\sqrt{MPhA}$

16. Pressure versus temperature graph of an ideal gas to equal number of moles of different volumes are plotted as shown in figure. Choose the correct alternative



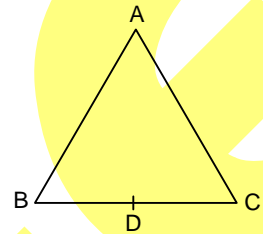
- (A)  $V_1 = V_2 = V_3 = V_4$   
 (B)  $V_4 > V_3 > V_2 > V_1$   
 (C)  $V_1 = V_2; V_3 = V_4$  and  $V_2 > V_3$   
 (D)  $V_1 = V_2; V_3 = V_4$  and  $V_2 < V_3$

17. Two liquids A and B are at  $32^\circ\text{C}$  and  $24^\circ\text{C}$  when mixed in equal masses the temperature of the mixture is found to be  $28^\circ\text{C}$ . Their specific heats are in the ratio of

- (A) 3 : 2  
 (B) 2 : 3  
 (C) 1 : 1  
 (D) 4 : 3

Space For Rough Work

18. A source of sound of single frequency  $\nu_0$  flies along a straight line which is at a finite distance from the observer. Then the observer hears  
 (A) a frequency  $\nu_0$  at the instant when the source is nearest to him.  
 (B) a frequency greater than  $\nu_0$  at the instant when the source is nearest to him.  
 (C) a frequency  $\nu_0$  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.
19. Three metal rods of the same length and area of cross-section form an equilateral triangle as shown in figure D is the mid-point of side BC. If AD is independent for small change in temperature, then ( $\alpha_1$  is the coefficient of linear expansion for rod BC and  $\alpha_2$  for rods AB and AC)



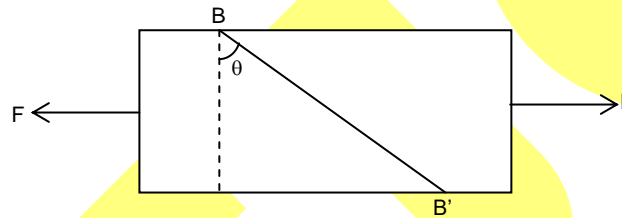
(A)  $\alpha_1 = 2\alpha_2$

(B)  $\alpha_1 = \frac{\alpha_2}{2}$

(C)  $\alpha_2 = \alpha_1$

(D)  $\alpha_1 = 4\alpha_2$ 

20. A bar of cross section A is subjected to two equal and opposite tensile forces F at its ends as shown in Figure. Suppose there is a plane BB' through the bar making an angle  $\theta$  with a plane at right angle to the bar.



What is the shearing stress on the plane BB'?

(A)  $\frac{F}{A}$

(B)  $\frac{F \cos \theta}{A}$

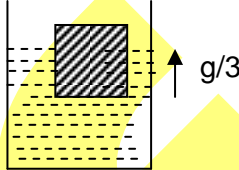
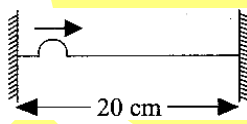
(C)  $\frac{F}{A} \sin \theta$

(D)  $\frac{F \sin 2\theta}{2A}$

### PART-B Numerical Type

1. A bus is moving towards a huge wall with a velocity of 5 m/s. The driver sounds a horn of frequency 200 Hz. The frequency of the beats heard by a passenger of the bus will be (In Hz) nearly (velocity of sound in air = 338 m/s)

Space For Rough Work

2. A body cools in a surrounding of a constant temperature  $30^{\circ}\text{C}$ . Its heat capacity is  $2 \text{ J/C}^{\circ}$ . Initial temperature of the body is  $40^{\circ}\text{C}$ . Assume Newton's law of cooling is valid. The body cools to  $38^{\circ}\text{C}$  in 10 minutes when the body temperature has reached  $38^{\circ}\text{C}$ , it is heated again so that it reaches to  $40^{\circ}\text{C}$  in 10 minutes. Find the total heat required (in J) from heater by the body.
3. A cubical block is floating in a liquid with half of its volume immersed in the liquid. When the whole system accelerates upwards with a net acceleration of  $g/3$ . Find the fraction of volume immersed in the liquid.
- 
4. A string of length 20 cm and linear mass density  $0.40 \text{ g/cm}$  is fixed at both ends and is kept under a tension of 16 N. A wave pulse is produced at  $t = 0$  near an end as shown in figure which travels towards the other end. When will the string have the shape shown in the figure again? (in seconds)
- 
5. A body of mass 10kg is connected to a wire of length 0.3 m and of cross sectional area  $10^{-6} \text{ m}^2$ , its breaking strength is  $4.8 \times 10^7 \text{ N/m}^2$ . Find the maximum angular velocity with which it can be rotated in a horizontal circle on a smooth plane (In rad/sec)

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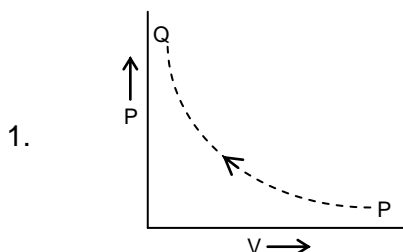
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# Chemistry

## PART – A

### Straight Objective Type

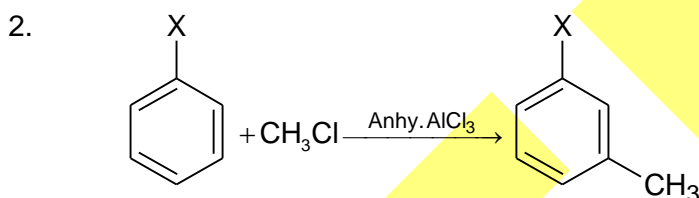
This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.



In above, one mole of an ideal gas is subjected to reversible compression along path  $P \rightarrow Q$ .

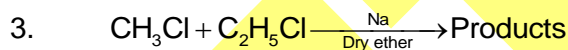
Choose correct statement

- (A) the final pressure and the initial pressure of the path are same.  
 (B) in each stages (represented by the broken lines) the pressure remains constant.  
 (C) the initial pressure is higher than the final pressure.  
 (D) it is an isobaric process



Which of the following can be 'X' in the above reaction?

- (A)  $\text{CH}_3$  (B)  $\text{OH}$   
 (C)  $\text{CN}$  (D)  $\text{C}_2\text{H}_5$



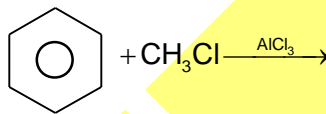
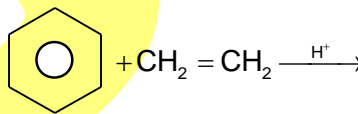
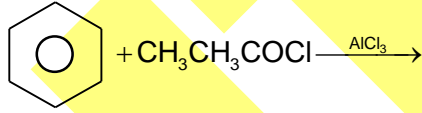
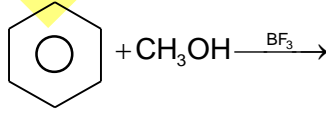
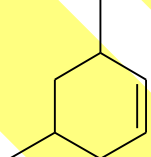
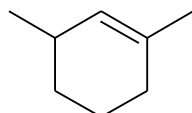
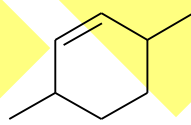
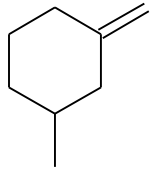
Which is not a product of above reaction?

- (A)  $\text{C}_2\text{H}_6$  (B)  $\text{C}_4\text{H}_{10}$   
 (C)  $\text{C}_3\text{H}_8$  (D)  $\text{C}_5\text{H}_{12}$

4. Which reaction does not form ethane?

- (A)  $\text{HC} \equiv \text{CH} + \text{H}_2 \xrightarrow{\text{Ni}}$  (B)  $\text{CH}_3\text{CH}_2\text{COONa} \xrightarrow[\Delta]{\text{Sodalime}}$   
 (C)  $\text{CH}_3\text{COONa} \xrightarrow{\text{Electrolysis}}$  (D)  $\text{CH}_3\text{CH}_2\text{Cl} \xrightarrow[\Delta]{\text{KOH}/\text{C}_2\text{H}_5\text{OH}}$

Space For Rough Work

5. One mole of an ideal gas undergoes isothermal and reversible expansion from 2 L to 4 L at 300 K. The entropy change of the system taking place during the process is  
 (A)  $2.303 RT \log 2$  (B)  $2.303 R \log 2$   
 (C)  $2.303 R \log \frac{1}{2}$  (D)  $2.303 RT \log \frac{1}{2}$
6. Which of the following substance forms an alcohol when reacts with  $H_2O/H^+$ ?  
 (A)  $CH_3CH_2CH_2CH_3$  (B)  $CH_3CH_2CH=CH_2$   
 (C)  $CH_3CH_2C\equiv CH$  (D)  $CH_3C\equiv CCH_3$
7. Which of the following alcohol undergoes the easiest dehydration reaction?  
 (A)  $CH_3CH_2CH_2CH_2CH_2OH$  (B)  $CH_3CH_2CH(OH)CH_2CH_3$   
 (C)  $\begin{array}{c} C_2H_5 \\ | \\ CH_3-C-OH \\ | \\ CH_3 \end{array}$  (D)  $\begin{array}{c} OH \\ | \\ CH_3 \\ | \\ CH_3-C-CH_2OH \\ | \\ CH_3 \end{array}$
8.  $Br_2(l) \longrightarrow Br_2(g); \Delta H = x kJ mol^{-1}$  at 298K  
 Choose the correct statements  
 (A)  $\Delta_f H^\circ$  of  $Br(l) = x kJ mol^{-1}$   
 (B)  $\Delta_f H^\circ$  of  $Br_2(g) = x kJ mol^{-1}$   
 (C) The heat of condensation of  $Br_2(g)$  into  $Br_2(l)$  is  $x kJ mol^{-1}$   
 (D)  $\Delta_f H^\circ$  of  $Br_2(g) = \text{zero}$
9. The product of which reaction does not undergo further substitution by electrophiles?  
 (A)  (B)   
 (C)  (D) 
10. Which of the following cycloalkene does not follow Markownikoff's rule?  
 (A)  (B)   
 (C)  (D) 

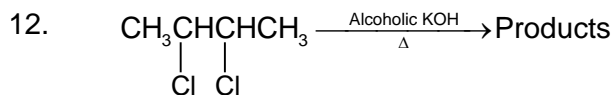
Space For Rough Work



11. One mole of an ideal gas was heated from 420 K to 440 K at constant pressure. How much heat will be absorbed by the gas in  $\text{kJ mol}^{-1}$  unit?

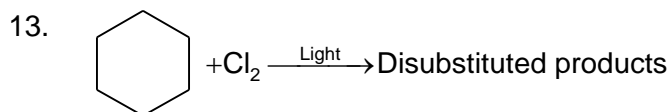
$$[R = 8.3 \text{ JK}^{-1} \text{ mol}^{-1}, C_p = \frac{5}{2}R]$$

- (A) 4.15 (B) 0.415  
(C) 0.249 (D) 2.49



Which of the following cannot be a product of above reaction?

- (A)  $\text{CH}_3\text{C} \equiv \text{CCH}_3$  (B)  $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$   
(C)  $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2$  (D)  $\text{CH}_3\underset{\text{Cl}}{\text{CH}}\text{CH} = \text{CH}_2$



How many disubstituted products are formed in the above reaction?

[Do not consider stereoisomerism]

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

14. Due to reversible expansion of an ideal gas in an isolated thermodynamic system, the temperature of the system decreases. Which process is going in the system?

- (A) Isothermal process (B) Adiabatic process  
(C) Isobaric process (D) Isochoric process

15. Which of the following reaction forms optical isomers?



16. Which of the following hydrocarbon cannot be prepared by Kolbe's electrolysis method?

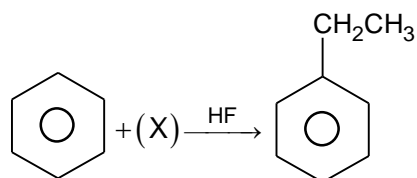
- (A)  $\text{C}_2\text{H}_6$  (B)  $\text{C}_2\text{H}_2$   
(C)  $\text{C}_2\text{H}_4$  (D)  $\text{CH}_4$

17. Which of the following substance forms alkene when heated with zinc dust?



Space For Rough Work

18.

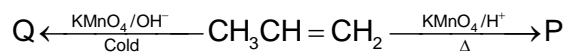


In the above reaction, (X) is

- (A)  $\text{CH}_3\text{CH}_2\text{Cl}$   
 (C)  $\text{CH}_2 = \text{CH}_2$

- (B)  $\text{CH}_3\text{CH}_2\text{Br}$   
 (D)  $\text{HC} \equiv \text{CH}$

19.

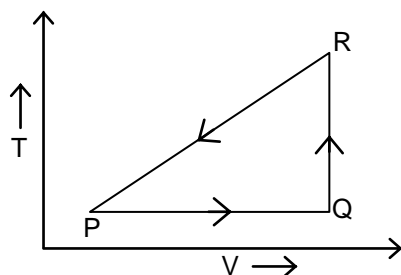


Which of the following atoms are present in equal number in the organic products P and Q?

- (A) Carbon  
 (C) Oxygen

- (B) Hydrogen  
 (D) Both hydrogen & oxygen

20.



Choose the correct statement.

- (A) Compression of system takes place along path  $\text{P} \rightarrow \text{Q}$   
 (B) No work done along  $\text{R} \rightarrow \text{P}$   
 (C)  $\text{R} \rightarrow \text{P}$  is the isobaric process  
 (D) Work done along path  $\text{R} \rightarrow \text{P}$  is higher than that done along  $\text{P} \rightarrow \text{R}$

Space For Rough Work

**PART-B**  
**Numerical Type**

1. A system absorbs 400 J energy from surrounding and utilized 380 J heat as work in lifting a mass attached with the piston. If the change in internal energy of the system is expressed as  $(4x + 5)J$ , what is the value of  $x$ ?
2. One mole of an ideal gas was subjected expansion adiabatically, against a constant pressure of 0.1 atm. The volume changed for 2 L to 4L in the expansion process. If the change in internal energy( $\Delta U$ ) is expressed as  $-x J mol^{-1}$ . What is the value of  $x$ ?  
[1 L atm = 101.3 J]
3. The enthalpy change ( $\Delta H$ ) of the following reaction  $A(s) + B(g) \longrightarrow C(g)$  is  $0.4 kJ mol^{-1}$ . What is the internal energy change ( $\Delta U$ ) of the reaction in  $kJ mol^{-1}$  unit?
4. What is the molar mass in  $g mol^{-1}$  unit, of the most simple unsaturated hydrocarbon that can be prepared by Kolbe's electrolysis?
5. How many pi-electron(s) is/are present in heptan-1, 4-diyne?

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*Space For Rough Work*

# Mathematics

## PART – A

### Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

- If  $5x + 9 = 0$  is the directrix of the hyperbola  $16x^2 - 9y^2 = 144$ , then its corresponding focus is  
 (A) (5, 0) (B)  $\left(\frac{5}{3}, 0\right)$   
 (C) (-5, 0) (D)  $\left(-\frac{5}{3}, 0\right)$
- The most general solution of the equation  $\tan \theta = -1, \cos \theta = \frac{1}{\sqrt{2}}$  is  
 (A)  $n\pi + 7\frac{\pi}{4}$  (B)  $n\pi + (-1)^n \frac{7\pi}{4}$   
 (C)  $2n\pi + \frac{7\pi}{4}$  (D) none of these
- The most general solutions of the equation  $\sec^2 x = \sqrt{2}(1 - \tan^2 x)$  are given by  
 (A)  $n\pi + \frac{\pi}{8}$  (B)  $n\pi \pm \frac{\pi}{4}$   
 (C)  $n\pi \pm \frac{\pi}{8}$  (D) none of these
- If the eccentricity of the standard hyperbola passing through the point (4, 6) is 2, then the equation of the tangent to the hyperbola at (4, 6) is:  
 (A)  $2x - 3y + 10 = 0$  (B)  $x - 2y + 8 = 0$   
 (C)  $2x - y - 2 = 0$  (D)  $3x - 2y = 0$
- The remainder obtained when  $|1| + |2| + |3| + \dots + |95|$  is divided by 15 is  
 (A) 3 (B) 14  
 (C) 1 (D) none of these
- The number of values of  $x$  in the interval  $[0, 5\pi]$  satisfying the equation  $3\cos 2x - 10\cos x + 7 = 0$  is  
 (A) 5 (B) 6  
 (C) 8 (D) 10

Space For Rough Work

7. If a hyperbola passing through the origin has  $3x-4y-1=0$  and  $4x-3y-6=0$  as its asymptotes, then the equation of its transverse and conjugate axes are  
(A)  $x-y-5=0$  and  $x+y+1=0$  (B)  $x-y=0$  and  $x+y+5=0$   
(C)  $x+y-5=0$  and  $x-y-1=0$  (D)  $x+y-1=0$  and  $x-y-5=0$
8. In an ellipse, with centre at the origin, if the difference of the lengths of major axis and minor axis is 10 and one of the foci is at  $(0, 5\sqrt{3})$ , then the length of its latus rectum is:  
(A) 6 (B) 5  
(C) 8 (D) 10
9. A committee of 11 members is to be formed from 8 males and 5 females. If  $m$  is the number of ways the committee is formed with at least 6 males and  $n$  is the number of ways the committee is formed with at least 3 females, then:  
(A)  $n = m - 8$  (B)  $m + n = 68$   
(C)  $m = n = 78$  (D)  $m = n = 68$
10. Tangents are drawn from the points on the line  $x - y - 5 = 0$  to  $x^2 + 4y^2 = 4$ . Then all the chords of contact pass through a fixed point, whose coordinates are  
(A)  $\left(\frac{4}{5}, -\frac{1}{5}\right)$  (B)  $\left(\frac{4}{5}, \frac{1}{5}\right)$   
(C)  $\left(-\frac{4}{5}, -\frac{1}{5}\right)$  (D) none of these
11. Number of ways dividing 50 workers into 25 pairs is.  
(A)  $\frac{50!}{2^{25} 25!}$  (B)  $\frac{50!}{25! 25!}$   
(C)  $\frac{50!}{2^{25}}$  (D) none
12. Number of permutations of all the letters in "CASANAVA" that does not end with A can be expressed in the form of  $\frac{m!}{n!}$ , then the value of  $(m+n)$ , is  
(A) 10 (B) 11  
(C) 12 (D) 13

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13. Two poles standing on a horizontal ground are of heights 5m and 10 m respectively. The line joining their tops makes an angle of  $15^\circ$  with ground. Then the distance (in m) between the poles, is
- (A)  $\frac{5}{2}(2 + \sqrt{3})$  (B)  $5(\sqrt{3} + 1)$   
(C)  $5(2 + \sqrt{3})$  (D)  $10(\sqrt{3} - 1)$
14. If the middle term of  $\left(x^2 + \frac{1}{x}\right)^n$  is  $924 x^6$ , then value of n is
- (A) 8 (B) 10  
(C) 12 (D) 20
15. The number of seven digit integers with sum of the digits equal to 10 and formed by using the digits 1,2 and 3 only is:
- (A) 67 (B) 77  
(C) 78 (D) 96
16. The angle between the asymptotes of the hyperbola  $2x^2 + 5xy + 2y^2 - 11x - 7y - 4 = 0$
- (A)  $\tan^{-1} \frac{3}{4}$  (B)  $\tan^{-1} \frac{4}{3}$   
(C)  $\frac{\pi}{3}$  (D)  $\frac{\pi}{6}$
17. Total number of 6 – digit numbers in which only and all the five digits 1, 3, 5, 7 and 9 appear, is
- (A)  $5^6$  (B)  $6!$   
(C)  $\frac{5}{2}(6!)$  (D)  $\frac{1}{2}(6!)$
18. The term independent of x in the expansion  $\left(\frac{x}{4} - \frac{12}{x^2}\right)^{12}$  is
- (A)  ${}^{12}C_4 \frac{3^4}{4^4}$  (B)  ${}^{-12}C_5 \frac{3^5}{4^2}$   
(C)  ${}^{12}C_6 3^6$  (D)  ${}^{12}C_5 \frac{3^5}{4^2}$

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Space For Rough Work

19. A variable chord of a hyperbola  $\frac{x^2}{4} - \frac{y^2}{8} = 1$  subtends a right angle at the centre of hyperbola. If the chord of hyperbola touches a fixed circle of radius R which is concentric with hyperbola, then find  $R^2$ .
- (A) 4 (B) 8  
(C) 12 (D) 16
20. If line pass through the point  $(-3, -5)$  and intersect the ellipse  $\frac{x^2}{4} + \frac{y^2}{9} = 1$  at point A and B. Then the locus of mid – point of line joining A and B is:
- (A)  $4x^2 + 9y^2 + 20x + 27y = 0$  (B)  $9x^2 + 4y^2 + 20x + 27y = 0$   
(C)  $4x + 9y^2 + 27x + 20y = 0$  (D)  $9x^2 + 4y^2 + 27x + 20y = 0$

**PART-B**  
**Numerical Type**

1. If the tangents on the ellipse  $4x^2 + y^2 = 8$  at the points  $(1, 2)$  and  $(a, b)$  are perpendicular to each other, then  $\frac{b^2}{a^2}$  is equal to:
2. If the number of five digit numbers with distinct digits and 2 at the  $10^{\text{th}}$  place is  $336k$ , then k is equal to:
3. A test consists of 6 multiple choice questions, each having 4 alternative answers of which only one is correct. The number of ways, in which a candidate answers all six questions such that exactly four of the answers are correct, is .....
4. The angle of elevation of a cloud C from a point P, 200 m above a still take is  $30^\circ$ . If the angle of depression of the image of C in the lake from the point P is  $60^\circ$ , then PC (in m) is equal to
5. The remainder when  $27^{40}$  is divided by 12 is

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*Space For Rough Work*

# FIITJEE INTERNAL TEST

BATCHES: Two Year CRP(2224) A-lot\_JEEM  
PHASE TEST – III

PHYSICS, CHEMISTRY & MATHEMATICS

## ANSWER KEY

Paper Code  
100189

### SECTION – I

(PHYSICS)

#### PART – A

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. A  | 2. D  | 3. B  | 4. A  |
| 5. B  | 6. C  | 7. A  | 8. A  |
| 9. B  | 10. C | 11. B | 12. A |
| 13. D | 14. A | 15. A | 16. C |
| 17. C | 18. A | 19. D | 20. D |

#### PART – B

- |      |      |         |         |
|------|------|---------|---------|
| 1. 6 | 2. 4 | 3. 0.50 | 4. 0.02 |
| 5. 4 |      |         |         |

### SECTION – II

(CHEMISTRY)

#### PART – A

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. B  | 2. C  | 3. D  | 4. D  |
| 5. B  | 6. B  | 7. C  | 8. B  |
| 9. C  | 10. C | 11. B | 12. C |
| 13. C | 14. B | 15. B | 16. D |
| 17. C | 18. C | 19. C | 20. C |

#### PART – B

- |                           |                              |
|---------------------------|------------------------------|
| 1. 3.75(Range 3.6 to 3.8) | 2. 20.26(Range 20.1 to 20.3) |
| 3. 0.4                    | 4. 26                        |
|                           | 5. 8                         |

### SECTION – III (MATHEMATICS)

#### PART – A

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. C  | 2. C  | 3. C  | 4. C  |
| 5. A  | 6. C  | 7. C  | 8. B  |
| 9. C  | 10. A | 11. A | 12. A |
| 13. C | 14. C | 15. B | 16. A |
| 17. C | 18. A | 19. B | 20. D |

#### PART – B

- |       |      |        |        |
|-------|------|--------|--------|
| 1. 64 | 2. 8 | 3. 135 | 4. 400 |
| 5. 9  |      |        |        |