

# FIITJEE - JEE (Main)

## PHYSICS, CHEMISTRY & MATHEMATICS

BATCHES: NWCMSR122A1,NWSW122A1,NWCMSR122B1,NWSW122B1,CSO-Online

### PHASE TEST – II

Q.P. CODE:

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

- Attempt ALL the questions. Answers have to be marked on the OMR sheets.
- This question paper contains **Three Sections**.
- Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
- Each **Section** is further divided into **Two Parts: Part-A & C** in the OMR. Part-B of OMR to be left unused
- Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
- 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:

- Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
- 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.
- OMR sheet contains alphabets, numerals & special characters for marking answers.
- Do not fold or make any stray marks on the Answer Sheet.**

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

- 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.
- Part-B (01-05)** contains five (05) Numerical based questions, the answer of which may be positive or negative numbers or decimals (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

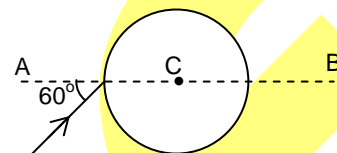
## PART – A

### 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.

1. A ray of light falls on a transparent sphere with centre of C as shown in figure. The ray emerges from the sphere parallel to line AB. The refractive index of the sphere is

(A)  $\sqrt{3/2}$  (B)  $2/\sqrt{3}$   
(C) 2 (D)  $\sqrt{3}$



1. **D**

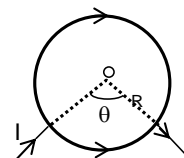
2. A charged particle moves in a uniform magnetic field perpendicular to it, with a radius of curvature 4 cm. On passing through a metallic sheet, it loses half of its kinetic energy. Then, the radius of curvature of the particle's path is

(A) 2 cm (B) 4 cm  
(C) 8 cm (D)  $2\sqrt{2}$  cm

2. **D**

3. Magnetic field intensity  $B$  at the centre of the circular loop is

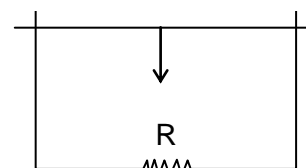
(A) zero (B)  $\frac{\mu_0 I (2\pi - \theta)}{4\pi R}$   
(C)  $\frac{\mu_0 I \theta}{4\pi R}$  (D)  $\frac{\mu_0 I^2 (\pi - \theta)}{4\pi R}$



3. **A**

4. A straight conductor with its length in the East-West direction falls under gravity. As a result of this motion being in the Earth's magnetic field, choose the **INCORRECT** option.

(A) induced emf develops with the East end of the conductor at higher potential than the West end.  
(B) induced emf develops with the East end of the conductor at lower potential than the West end.  
(C) induced current passes from East end to the West end in resistor.  
(D) induced current passes from West end to the East end in rod.



4. **B**

5. Light of wavelength  $3500\text{\AA}$  is incident on two metals A and B, A of work function 4.2 eV and B of work function 1.19 eV respectively. The photoelectrons will be emitted by

(A) metal A (B) metal B  
(C) both A and B (D) neither metal A nor metal B

5. **B**

6. When a hydrogen atom emits a photon in going from  $n = 2$  to  $n = 1$ , its recoil speed approximately is

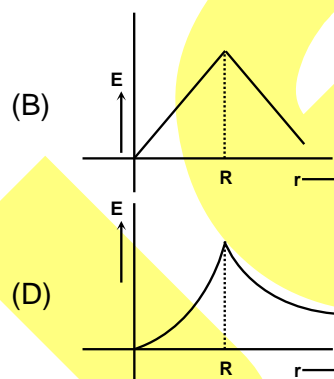
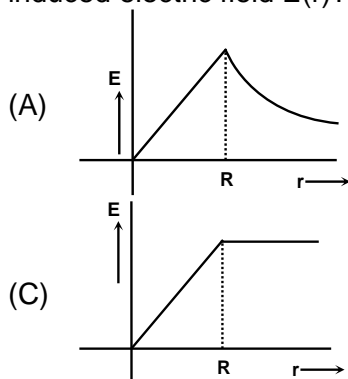
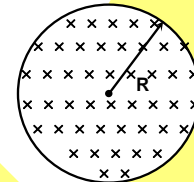
(A) 12.8 m/s (B) 960 m/s (C) 6.4 m/s (D) 3.2 m/s

6. **D**

7. A magnetic needle of magnetic moment  $6.7 \times 10^{-2} \text{ Am}^2$  and moment of inertia  $7.5 \times 10^{-6} \text{ kg m}^2$  is performing simple harmonic oscillations in a magnetic field of 0.01 T. Time taken for 10 complete oscillations is:
- (A) 8.76 s (B) 6.65 s  
(C) 8.89 s (D) 6.98 s

7. **B**

8. Figure shows a circular area of radius R where a uniform magnetic field  $\vec{B}$  is going into the plane of paper and increasing in magnitude at a constant rate. In that case, which of the following graphs, drawn schematically, correctly shows the variation of the induced electric field  $E(r)$ ?

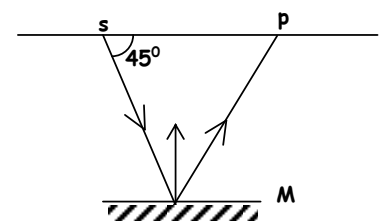


8. **A**

9. Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon
- (A) the rates at which current are changing in the two coils  
(B) relative position and orientation of the two coils  
(C) the materials of the wires of the coils  
(D) the currents in the two coils

9. **B**

10. A flat mirror M is arranged parallel to a wall and light from a point source S on the wall is reflected back to the wall. With what velocity will be spot move along the wall if the mirror is brought up to the wall with a velocity  $v$ ?



- (A) Zero (B)  $2v$   
(C)  $v/2$  (D)  $v$

10. **B**

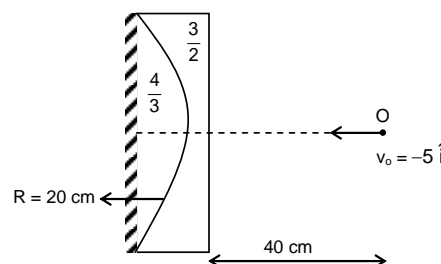
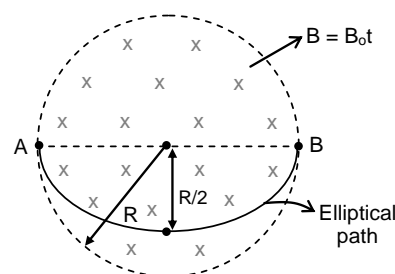
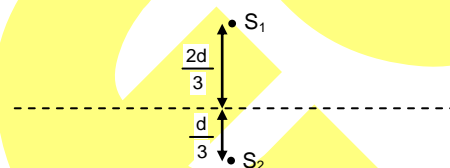
11. The work function of metal is 1 eV. Light of wavelength  $3000 \text{ \AA}$  is incident on this metal surface. The velocity of emitted photo-electrons will be
- (A) 10 m/s (B)  $1 \times 10^3 \text{ m/s}$   
(C)  $1 \times 10^4 \text{ m/s}$  (D)  $1 \times 10^6 \text{ m/s}$

11. **D**

12. A nuclear fusion reaction is given  ${}_1\text{H}^2 + {}_1\text{H}^2 \rightarrow \text{He}^3 + {}_0\text{n}^1 + Q(\text{energy})$ . If 2 moles of deuterium are fused, then total released energy is
- (A)  $2Q$  (B)  $4Q$   
(C)  $Q \times 6.02 \times 10^{23}$  (D)  $Q \times 2 \times 6 \times 10^{23}$

12. **C**

13. In a Young's double slit experiment, let  $S_1$  and  $S_2$  be the two slits. A thin film of thickness 't' and of index  $\mu$  is placed in front of  $S_1$ . The central maximum will shift  
 (A) towards  $S_1$  (B) towards  $S_2$   
 (C) will not shift (D) none of these
13. **A**
14. The energy of a photon is half the kinetic energy of an electron. The energy of the photon is E. Let  $\lambda_1$  be the de Broglie wavelength of the electron and  $\lambda_2$  be the wavelength of the photon. The ratio  $\lambda_1/\lambda_2$  is proportional to  
 (A)  $E^0$  (B)  $E^{1/2}$  (C)  $E^{-1}$  (D)  $E^2$
14. **B**
15. Two coherent point sources of frequency ( $f = \frac{10v}{d}$  where v is speed of light in air) are placed at a distance d apart as shown in figure. The receiver is free to move along the dotted line shown in the figure. Find total number of maxima heard by receiver.  
 (A) 6 (B) 7  
 (C) 5 (D) 8
15. **A**
16. Electrons with de-Broglie wavelength  $\lambda$  fall on the target in an X-ray tube. The cut-off wavelength of the emitted X-rays is  
 (A)  $\lambda_o = \frac{2mc\lambda^2}{h}$  (B)  $\lambda_o = \frac{2h}{mc}$  (C)  $\lambda_o = \frac{2m^2c^2\lambda^3}{h^2}$  (D)  $\lambda_o = \lambda$
16. **A**
17. There is a uniform time varying magnetic field in a circular region as shown in the figure. Find out the potential difference across 2 point along an elliptical path as shown in figure.  
 (A)  $\frac{\pi R^2}{2} B_o$  (B)  $\frac{\pi R^2}{2} B_o$   
 (C)  $\frac{\pi R^2}{4} B_o$  (D)  $\frac{\pi R^2}{5} B_o$
17. **C**
18. A perfectly absorbing surface intercepts a parallel beam of monochromatic light of power 10 W ( $\lambda = 500$  nm) incident on it normally the force exerted by light beam on the surface is  
 (A)  $\frac{1}{4} \times 10^{-7}$  N (B)  $\frac{1}{3} \times 10^{-7}$  N (C)  $\frac{1}{2} \times 10^{-7}$  N (D)  $1 \times 10^{-7}$  N
18. **B**
19. The lens combination having refractive indices  $\frac{4}{3}$  &  $\frac{3}{2}$  as shown in the figure, is silvered. The velocity of image will be?  
 (A)  $1.8 \hat{i}$  (B)  $3 \hat{i}$   
 (C)  $3.6 \hat{i}$  (D)  $5 \hat{i}$



19. A



20. If electron is accelerated upto KE of  $2\phi_0$  and then made to fall of a metal surface with function  $\phi_0$ , then which of the following is not correct?  
 (A) the maximum KE of X-ray photon will be  $\phi_0$   
 (B) the maximum KE of X-ray photon will be  $2\phi_0$   
 (C) the minimum wavelength of X-ray produced may be  $\frac{hc}{2\phi_0}$   
 (D) the maximum wavelength produced will be  $\infty$
20. **A**

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

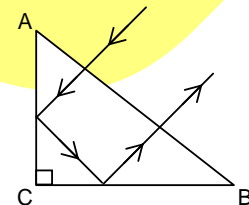
21. The coercivity of a small magnet where the ferromagnet gets demagnetized is  $3 \times 10^3 \text{ Am}^{-1}$ . The current required to be passed in a solenoid of length 10 cm and number of turns 100, so that the magnet gets demagnetized when inside the solenoid, is:

21. **3**

22. Two parallel current carrying conductor exert some force on each other. If the current in both conductors is doubled the force become k times. Find the value of k.

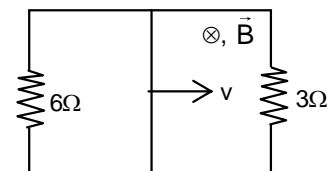
22. **4**

23. A ray of light incident normally on face AB of an isosceles prism as shown in figure. The least value of refractive index of the prism must have  $\sqrt{k}$ , then 'k' is



23. **2**

24. A rectangular loop with a sliding connector of length  $\ell = 1.0 \text{ m}$  is situated in a uniform magnetic field  $B = 2 \text{ T}$  perpendicular to the plane of loop. Resistance of connector is  $r = 2\Omega$ . Two resistances of  $6\Omega$  and  $3\Omega$  are connected as shown in figure. The external force required to keep the connector moving with a constant velocity  $v = 2 \text{ m/s}$  is



24. **2**

25. A fish rising vertically to the surface of water in a lake uniformly at the rate of 3 m/s observes a king-fisher (bird) diving vertically towards the water at a rate of 9 m/s vertically above it. If the refractive index of water is  $(4/3)$ , find the actual velocity of the dive of the bird (in m/s).

25. **4.50**

*Space For Rough Work*

# 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.

1. Electrolysis of the aqueous solution of NaCl release gas(X) at cathode and gas(Y) at anode. How much faradays of electricity should be passed in order to produce two moles each of X and Y gases?

(A) 2F (B) 4F (C) 8F (D) 16 F

1. **B**

2. Which of the following statement is not correct for primitive cubic unit cell?

(A) Interfacial angles:  $\alpha = \beta = \gamma$   
 (B) Only the corners of the cube are occupied with particles of solid  
 (C) Number of particles per unit cell = 1  
 (D) The centre of the cube is regarded as an octahedral void

2. **D**

3. The vapour pressure of a solution of two liquids A and B is expressed as

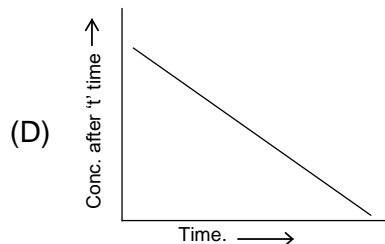
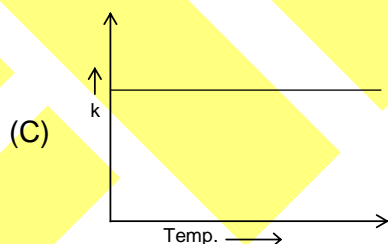
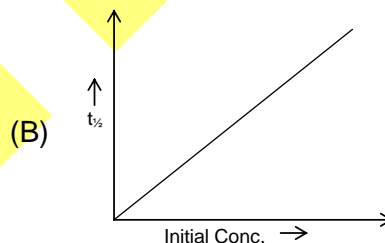
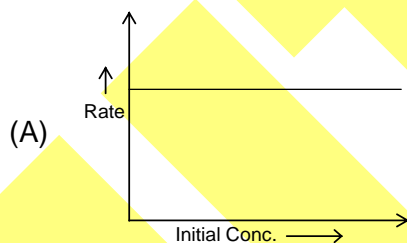
$$V.P = (300 X_A + 200) \text{ cm of Hg}$$

What is the vapor pressure of the pure liquid 'A' in cm of Hg unit?

(A) 500 (B) 200 (C) 700 (D) 100

3. **A**

4. Which of the following graph is not correct for a zero order reaction?



4. **C**

5.  $2X(g) \rightleftharpoons 3Y(g) + Z(g)$

What is the unit of the equilibrium constant  $K_p$  of the above reaction?

(A)  $\text{atm}^{-2}$  (B)  $\text{atm}^2$  (C)  $\text{atm}^{-1}$  (D)  $\text{atm}$

5. **B**

6. The ionic product of a salt is  $x$  and its solubility product is  $y$ . Which of the following is correct for the saturated solution of the salt?  
 (A)  $x > y$  (B)  $x < y$  (C)  $x = y$  (D) unpredictable
6. **C**
7. Which of the following gas can absorb heat from the atmosphere by maximum extent?  
 (A)  $H_2$  (B)  $CO_2$  (C) He (D) Ne
7. **B**
8.  $2N_2O_5(g) \rightleftharpoons 4NO_2(g) + O_2(g)$   
 The rate of above reaction is equal to the  
 (A) rate of disappearance of  $N_2O_5$  (B) rate of formation of  $NO_2$   
 (C) rate of formation of  $O_2$  (D) all are correct
8. **C**
9.  $4X(s) \rightleftharpoons 2Y(g) + Z(g)$   
 The equilibrium constant  $K_P$  of above reaction is  $32 \text{ atm}^3$ . What is the equilibrium partial pressure of Z gas?  
 (A) 8 atm (B) 4 atm (C) 10.3 atm (D) 2 atm
9. **D**
10. The hydrolysis constant ( $K_h$ ) of  $NH_4Cl$  can be expressed as  
 (A)  $K_h = K_w \times K_a(\text{of } NH_4^+)$  (B)  $K_h = K_w \times K_b(\text{of } NH_4OH)$   
 (C)  $K_h = K_a(\text{of } NH_4^+)$  (D)  $K_h = K_b(\text{of } NH_4OH)$
10. **C**
11. In NaCl crystal, the  $Na^+$  ions occupy  
 (A)  $\frac{1}{2}$  of tetrahedral voids (B)  $\frac{1}{4}$  of octahedral voids  
 (C) all tetrahedral voids (D) all octahedral voids
11. **D**
12. Which of the following can decrease the freezing of water by maximum extent?  
 (A)  $CH_3CH_2CH_2OH$  (B)  $HOCH_2CH_2CH_2OH$   
 (C)  $\begin{array}{c} CH_2CHCH_2 \\ | \quad | \quad | \\ OH \quad OH \quad OH \end{array}$  (D)  $\begin{array}{c} CH_3CHCH_2OH \\ | \\ OH \end{array}$
12. **C**
13. Common ion effect will be observed if HCl is added to the aqueous solution of  
 (A) NaOH (B) HCN (C) HI (D) KCl
13. **B**



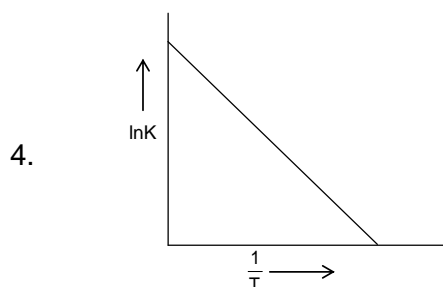
14. The molar conductance at infinite dilution of the following solutions in  $\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$  unit is given below.  
 $\text{HCl} = x$ ,  $\text{KCN} = y$  and  $\text{KCl} = z$   
 What will be the molar conductance of  $\text{HCN}$  in  $\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$  unit?  
 (A)  $x - y + z$  (B)  $x + z - y$  (C)  $x + y + z$  (D)  $x + y - z$
14. D
15. Which of the following solid is most susceptible to Schottky defect?  
 (A)  $\text{LiCl}$  (B)  $\text{MgCl}_2$  (C)  $\text{BeCl}_2$  (D)  $\text{KCl}$
15. D
16. The standard electrode potentials of four electrode(s) are given as follows:  
 $E_{\text{M}^{2+}/\text{M}}^0 = -0.78\text{V}$ ,  $E_{\text{N}^{2+}/\text{N}}^0 = -0.35\text{V}$ ,  $E_{\text{P}/\text{P}^{2+}}^0 = -0.19\text{V}$ ,  $E_{\text{Q}^{2+}/\text{Q}}^0 = -0.12\text{V}$   
 Which of the following ion can be reduced easily?  
 (A)  $\text{M}^{2+}$  (B)  $\text{N}^{2+}$  (C)  $\text{P}^{2+}$  (D)  $\text{Q}^{2+}$
16. C
17. The osmotic pressure of a solution is inversely proportional to  
 (A) temperature (B) number of moles of solute  
 (C) volume of solution (D) Van't Hoff factor
17. C
18. The least harmful atmosphere gas is  
 (A)  $\text{O}_2$  (B)  $\text{N}_2$   
 (C)  $\text{CO}_2$  (D) Ar
18. B
19. Salvarsan does not contain  
 (A) carbon (B) nitrogen  
 (C) oxygen (D) sulphur
19. D
20. Sucrose is a/an  
 (A) antioxidant (B) sweetening agent  
 (C) disinfectant (D) antiinflammatory drug
20. B

### PART-B Numerical Type

1. The relative lowering of vapour pressure of a solution of X and Y is 0.4. If the number of moles of the solvent X is 3, how many moles of Y is present in the solution?
1. 2
2. If the ratio of molar conductance to equivalent conductance of the solution of the salt  $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$  is  $x:y$ , the value of  $(x + y)$  is:
2. 9

3. Lithium metal crystal contain F.C.C unit cell with edge length  $2.854 \text{ \AA}$ . What will be the density of the metal in  $\text{g/cm}^3$  unit if it's atomic weight is 7?

3. 2



In the above figure,

$K$  = Equilibrium constant of a reversible reaction which attains equilibrium at  $TK$ .

If the intercept of the curve is 4, what will be the standard entropy change ( $\Delta S^\circ$ ) of the reaction in calorie unit? [ $R = 2 \text{ cal K}^{-1} \text{ mol}^{-1}$ ]

4. 8

5. A metal crystal contains f.c.c unit cell  
 If  $x$  = Relative number of metal atoms present per unit cell  
 $y$  = Number of lattice points of the unit cell  
 and  $z$  = Coordination number of metal

What is the value of  $\left(\frac{x+y-z}{4}\right)$ ?

5. 1.5

# 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.

1. The centroid of a triangle is (2, 3) and two of its vertices are (5, 6) and (– 1, 4). The third vertex of the triangle is  
 (A) (2, 1) (B) (2, – 1)  
 (C) (1, 2) (D) (1, – 2)
1. **B**
2. Let A(2, – 3) and B(– 2, 1) be vertices of a triangle ABC. If the centroid of this triangle moves on the line  $2x + 3y = 1$ , then the locus of the vertex C is the line  
 (A)  $2x + 3y = 9$  (B)  $2x - 3y = 7$   
 (C)  $3x + 2y = 5$  (D)  $3x - 2y = 3$
2. **A**
3. A square of side  $a$  lies above the  $x$ - axis and has one vertex at the origin. The side passing through the origin makes an angle  $\alpha$  ( $0 < \alpha < \frac{\pi}{4}$ ) with the positive direction of  $x$ - axis. The equation of its diagonal not passing through the origin is-  
 (A)  $y(\cos\alpha + \sin\alpha) + x(\cos\alpha - \sin\alpha) = a$   
 (B)  $y(\cos\alpha - \sin\alpha) - x(\sin\alpha - \cos\alpha) = a$   
 (C)  $y(\cos\alpha + \sin\alpha) + x(\sin\alpha - \cos\alpha) = a$   
 (D)  $y(\cos\alpha + \sin\alpha) + x(\sin\alpha + \cos\alpha) = a$
3. **A**
4. The equation of the straight line passing through the point (4, 3) and making intercepts on the coordinate axes whose sum is – 1 is  
 (A)  $\frac{x}{2} + \frac{y}{3} = -1$  and  $\frac{x}{-2} + \frac{y}{1} = -1$  (B)  $\frac{x}{2} - \frac{y}{3} = -1$  and  $\frac{x}{-2} + \frac{y}{1} = -1$   
 (C)  $\frac{x}{2} + \frac{y}{3} = 1$  and  $\frac{x}{2} + \frac{y}{1} = 1$  (D)  $\frac{x}{2} - \frac{y}{3} = 1$  and  $\frac{x}{-2} + \frac{y}{1} = 1$
4. **D**
5. The perpendicular bisector of the line segment joining P(1, 4) and Q(k, 3) has  $y$ -intercept –4. Then a possible value of  $k$  is -  
 (A) 2 (B) –2  
 (C) –4 (D) 1
5. **C**
6. Let PS be the median of the triangle with vertices P(2, 2), Q(6, –1) and R(7, 3). The equation of the line passing through (1, –1) and parallel to PS is -  
 (A)  $2x - 9y - 7 = 0$  (B)  $2x - 9y - 11 = 0$   
 (C)  $2x + 9y - 11 = 0$  (D)  $2x + 9y + 7 = 0$
6. **D**

7. Let  $P = (-1, 0)$ ,  $Q = (0, 0)$  and  $R = (3, 3\sqrt{3})$  be three points. Then the equation of the bisector of the angle PQR is  
 (A)  $(\sqrt{3}/2)x + y = 0$  (B)  $x + \sqrt{3}y = 0$   
 (C)  $\sqrt{3}x + y = 0$  (D)  $x + (\sqrt{3}/2)y = 0$
7. **C**
8. The greatest distance of the point  $P(10, 7)$  from the circle  $x^2 + y^2 - 4x - 2y - 20 = 0$  is  
 (A) 10 units (B) 15 units  
 (C) 5 units (D) 20 units
8. **B**
9. The equation of the tangent to the circle  $x^2 + y^2 + 4x - 4y + 4 = 0$  which makes equal intercepts on the positive coordinate axes is  
 (A)  $x + y = 2\sqrt{2}$  (B)  $x + y = 2$   
 (C)  $x + y = 2\sqrt{3}$  (D)  $x + y = 0$
9. **A**
10. If the two circles  $(x-1)^2 + (y-3)^2 = r^2$  and  $x^2 + y^2 - 8x + 2y + 8 = 0$  intersect in two distinct points, then  
 (A)  $2 < r < 8$  (B)  $r < 2$   
 (C)  $r = 2$  (D)  $r > 2$
10. **A**
11. The intercept on the line  $y = x$  by the circle  $x^2 + y^2 - 2x = 0$  is AB. Equation of the circle on AB as a diameter is  
 (A)  $x^2 + y^2 - x - y = 0$  (B)  $x^2 + y^2 - x + y = 0$   
 (C)  $x^2 + y^2 + x + y = 0$  (D)  $x^2 + y^2 + x - y = 0$
11. **A**
12. Normal at a point to the parabola  $y^2 = 4ax$ , when abscissa is equal to ordinate, will meet the parabola again at a point  
 (A)  $(6a, -9a)$  (B)  $(-9a, 6a)$   
 (C)  $(-6a, 9a)$  (D)  $(9a, -6a)$
12. **D**
13. The equation of a tangent to the parabola  $y^2 = 8x$  is  $y = x + 2$ . The point on this line from which the other tangent to the parabola is perpendicular to the given tangent is  
 (A)  $(1, 1)$  (B)  $(0, 2)$   
 (C)  $(2, 4)$  (D)  $(-2, 0)$
13. **D**

14. If  $a \neq 0$  and the line  $2bx + 3cy + 4d = 0$  passes through the points of intersection of the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$ , then

- (A)  $d^2 + (2b+3c)^2 = 0$  (B)  $d^2 + (3b+2c)^2 = 0$   
 (C)  $d^2 + (2b-3c)^2 = 0$  (D)  $d^2 + (3b-2c)^2 = 0$

14. **A**

15. The eccentricity of an ellipse with its center at the origin is,  $\frac{1}{2}$ . If one of the directrices is  $x = 4$ , then the equation of the ellipse is

- (A)  $3x^2 + 4y^2 = 1$  (B)  $3x^2 + 4y^2 = 12$   
 (C)  $4x^2 + 3y^2 = 12$  (D)  $4x^2 + 3y^2 = 1$

15. **B**

16. An ellipse has OB as semi minor axis, F and F' as foci and the angle FBF' is a right angle. Then the eccentricity of the ellipse is

- (A)  $\frac{1}{\sqrt{3}}$  (B)  $\frac{1}{4}$   
 (C)  $\frac{1}{2}$  (D)  $\frac{1}{\sqrt{2}}$

16. **D**

17. The ellipse  $x^2 + 4y^2 = 4$  is inscribed in a rectangle aligned with the coordinate axes, which in turn is inscribed in another ellipse that passes through the point (4, 0). Then the equation of the ellipse is

- (A)  $x^2 + 12y^2 = 16$  (B)  $4x^2 + 48y^2 = 48$   
 (C)  $4x^2 + 64y^2 = 48$  (D)  $x^2 + 16y^2 = 16$

17. **A**

18. The foci of the ellipse  $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$  and the hyperbola  $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$  coincide. Then the value of  $b^2$  is

- (A) 1 (B) 5  
 (C) 7 (D) 9

18. **C**

19. The locus of a point  $P(\alpha, \beta)$  moving under the condition that the line  $y = \alpha x + \beta$  is a tangent to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is

- (A) a hyperbola (B) a parabola  
 (C) a circle (D) an ellipse

19. **A**

20. For the hyperbola  $\frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$ , which of the following remains constant when  $\alpha$  varies ?
- (A) Eccentricity (B) Directrix  
(C) Abscissae of vertices (D) Abscissae of foci

20. **D**

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

21. If P (1, 2), Q (4, 6) R (5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then the value of (a + b) will be

21. **5**

22. The point diametrically opposite to the point P(1, 0) on the circle  $x^2 + y^2 + 2x + 4y - 3 = 0$  is (a, b). Then the value of |a+b| will be

22. **7**

23. A variable circle passes through the fixed point A(p, q) and touches x-axis. The locus of the other end of the diameter through A is  $(x - p)^2 = \lambda qy$ . Then the value of  $\lambda$  will be

23. **4**

24. The number of parabolas that can be drawn if two ends of the latus rectum are given are

24. **2**

25. In an ellipse, the distances between its foci is 6 and minor axis is 8, then its eccentricity comes out to be e. So the value of 5e will be

25. **3**

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*Space For Rough Work*

# FIITJEE INTERNAL TEST

BATCHES:

PHYSICS, CHEMISTRY & MATHEMATICS

JEE MAIN-PHASE-IV

ANSWER KEY

Paper Code

SECTION – I  
(PHYSICS)

PART – A

PART – B

SECTION – II  
(CHEMISTRY)

PART – A

PART – B

SECTION – III  
(MATHEMATICS)

PART – A

PART – B