FIITJEE Phase Test (JEE-Advanced)

PHYSICS, CHEMISTRY & MATHEMATICS

Pattern - CPT-1 | **QP Code:** | **Test - 4**

Time Allotted: 3 Hours **Maximum Marks: 183**

- 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** 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 Only One Part.

(i) **Part-A (01-07) –** Contains seven (07) multiple choice questions which have **One or More** correct answer.
Full Marks: **+4** If only the bubble(s) corresponding to all the correct options(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.

(ii) **Part-A (08-14) –** Contains seven (07) multiple choice questions which have ONLY ONE CORRECT answer Each question carries **+3 marks** for correct answer and **-1 marks** for wrong answer.

(iii) **Part-A (15-18) -** This section contains Two paragraphs. Based on each paragraph, there are Two multiple choice questions. Each question has only one correct answer and carries **+3 marks** for the correct answer and **-1 marks** for wrong answer.

Name of the Candidate :_____

Batch :_____ **Date of Examination :**_____

Enrolment Number :_____

BATCHES – (2022) B & C Lot

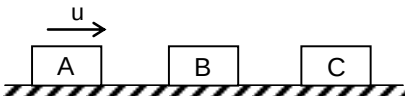
SECTION-1 : PHYSICS

PART – A

(Multi Correct Choice Type)

This section contains 7 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

1. Three identical blocks kept in a straight line on a friction less horizontal surface. The coefficient of restitution is $\frac{1}{2}$ for all collisions. If the left mass block has been given a velocity 'u' towards right as shown in figure, then finally



(A) speed of left most block = $\frac{1}{4}u$ (B) speed of left most block = $\frac{13}{64}u$

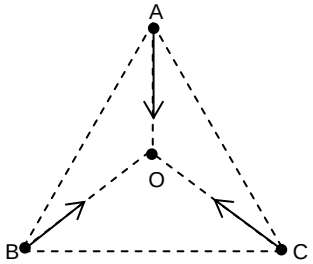
(C) speed of middle block = $\frac{3}{16}u$ (D) speed of middle block = $\frac{15}{16}u$

1. **BD**

2. A cannon shell is fired to hit a target at a horizontal distance R, however it breaks into two equal parts at its highest point, one part returns to the cannon. The other part
(A) will fall at a distance R beyond target
(B) will fall at a distance 3R beyond target
(C) will hit the target
(D) have nine times kinetic energy of first

2. **AD**

3. Three particle A,B and C of equal masses move with equal speeds v along the medians of an equilateral triangle . After collision A comes to rest while B retraces its path with speed v. The velocity of C is then



(A) V (B) direction $\overrightarrow{OA}$

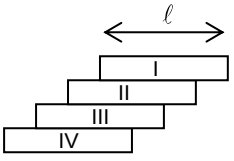
(C) 2V (D) direction $\overrightarrow{BO}$

3. **AD**

4. If the external forces acting on a system have zero resultant, the centre of mass
(A) must not move (B) must not accelerate
(C) may move (D) may accelerate

4. **BC**

5. Four bricks each of length l are put on the top of one another in such a way that part of each extends beyond the one beneath. The largest equilibrium extension are



(A) top brick over hanging the one below by $\frac{\ell}{2}$

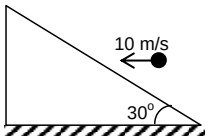
(B) second brick from top over hanging the one below $\frac{\ell}{4}$

(C) third brick from top overhanging by bottom one by $\frac{\ell}{6}$

(D) the total overhanging length on the edge of the bottom brick is $\frac{11}{12}\ell$

5. **ABCD**

6. A ball of mass 1 kg strikes a wedge of mass 4 kg horizontally with a velocity of 10 m/s. just after collision velocity of wedge becomes 4 m/s. Friction is absent every where and collision is elastic. Select the correct alternative (s):



(A) Speed of ball after collision is 6 m/s
(B) Speed of ball after collision is 8 m/s
(C) Impulse between ball and wedge during collision is 16 N –s
(D) Impulse between ball and wedge during collision is 32 N –s

6. **AD**

7. A raft of mass M with a man of mass 'm' abroad stays motionless on the surface of a lake. The man moves a distance ℓ' relative to raft with velocity v' and then stops. Assuming the water resistance to be negligible and length raft ℓ'.

(A) The displacement of the raft relative to the man is $\left(\frac{m\ell'}{M+m}\right)$

(B) The displacement of the raft relative to the shore is $\left(\frac{M\ell'}{M+m}\right)$

(C) The acceleration of raft during the motion is $\frac{mM}{M+m}\left(\frac{dv}{dt}\right)$

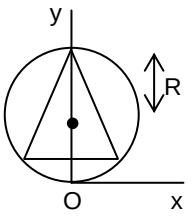
(D) Acceleration of raft will be zero.

7. **BC**

(Single Correct Choice Type)

This section contains **7 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

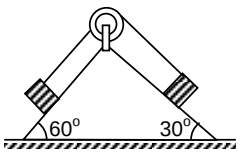
8. From a uniform disc of radius R an equilateral triangle of side
√3R as shown. find out the centre of mass of the remaining figure.



(A) (0, 0) (B) (0, R)
(C) (R, 0) (D) $\left(0, \frac{\sqrt{3}}{2R}\right)$

8. **B**

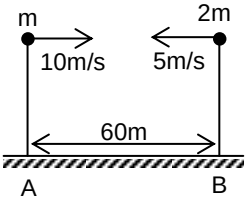
9. Two blocks of equal mass are tied with a light string which passes over a massless pulley as shown in figure. The magnitude of acceleration of centre of mass of both the blocks is (neglect friction everywhere)



(A) $\frac{\left(\sqrt{3}-1\right)^2}{2\sqrt{2}}g$ (B) $\left(\sqrt{3}-1\right)g$
(C) $\frac{g}{2}$ (D) $\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right)g$

9. **D**

10. Two particles one of mass m and the other of mass 2m are projected horizontally towards each other from the same level above the ground with velocities 10 m/s and 5 m/s respectively. They collide in air and stick to each other. The distance from A where the combined mass finally land is



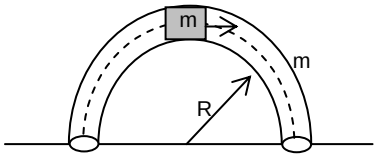
(A) 40 m (B) 20 m
(C) 30 m (D) 45 m

10. **A**

11. A particle of mass 200 g is dropped from a height of 50 m and another particle of mass 100 g is simultaneously projected up from the ground along the same line with a speed of 100 m/s. The acceleration of the centre of mass after 1s is
(A) 10 m/s^2 (B) 10/3 m/s^2
(C) 0 (D) none of these

11. **A**

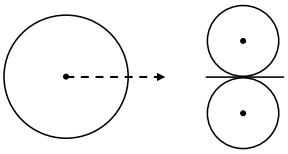
12. In a vertical plane inside a smooth hollow thin tube, a block of same mass as that of tube is released as shown. When it is slightly disturbed it moves towards right. By the time the block reaches the right end of the tube, the displacement of the tube will be (where 'R' is the mean radius of tube the assume that the tube remains in vertical plane) towards left



(A) $\frac{2R}{\pi}$ (B) $\frac{4R}{\pi}$ (C) $\frac{R}{2}$ (D) R

12. **C**

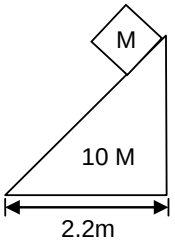
13. Two equal discs initially at rest are in contact on a smooth horizontal table. A third disc of same mass but of double radius strikes them symmetrically and comes to rest after impact. the coefficient of restitution is



(A) $\frac{3}{4}$ (B) $\frac{9}{16}$ (C) $\frac{3}{16}$ (D) $\frac{4}{9}$

13. **B**

14. A block of mass M is placed on the top of a bigger block of mass 10 M as shown in figure. All the surfaces are frictionless. The system is released from rest, then the distance moved by the bigger block at the instant the smaller block reaches the ground:
(A) 0.22m (B) 0.20 m
(C) zero (D) 0.24 m



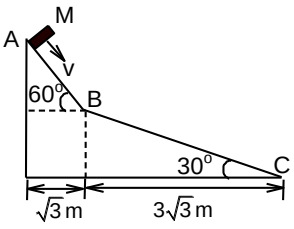
14. **B**

(Paragraph Type)

This section contains **2 paragraphs**. Based upon the paragraphs **2 multiple choice questions** have to be answered. Each of these questions has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Paragraph for Question no. 15 to 16

A small block of mass M moves on a frictionless surface of an inclined plane, as shown in figure. The angle of the incline suddenly changes from 60^o to 30^o at point B. The block is initially at rest at A. Assume that collisions between the block and the incline are totally inelastic (g = 10 m/s^2).



15. The speed of the block at point B immediately after it strikes the second incline is
(A) $\sqrt{60}\,m/s$ (B) $\sqrt{45}\,m/s$ (C) $\sqrt{30}\,m/s$ (D) $\sqrt{15}\,m/s$

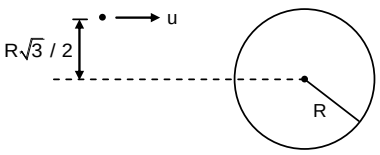
15. **B**

16. The speed of the block at point C, immediately before it leaves the second incline is
(A) $\sqrt{120}\,m/s$ (B) $\sqrt{105}\,m/s$ (C) $\sqrt{90}\,m/s$ (D) $\sqrt{75}\,m/s$

16. **B**

Paragraph for Question no. 17 to 18

A small particle travelling with a speed u towards right collides with a spherical body of equal mass as shown in figure. The centre of this spherical body is located a distance $\frac{\sqrt{3}}{2}R$ away from the direction of motion of the particle. The coefficient of restitution between them is $\frac{1}{2}$.



Then answer the following questions.

17. The speed of the sphere after the collision

(A) $\frac{4}{8}$ (B) $\frac{3u}{8}$ (C) $\frac{3u}{4}$ (D) none of these

17. **B**

18. The speed of the small particle after the collision

(A) $\frac{4}{8}$ (B) $\frac{7u}{8}$ (C) $\frac{3u}{8}$ (D) none of these

18. **B**

SECTION-2 : CHEMITRY

PART – A

(Multi Correct Choice Type)

This section contains 7 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

1. When $NaNO_3$ is heated in a closed vessel, oxygen is liberated and $NaNO_2$ is left behind. At equilibrium.
(A) addition of $NaNO_2$ favours reverse reaction
(B) addition of $NaNO_3$ favours forward reaction
(C) increasing temperature favours forward reaction
(D) increasing pressure favours reverse reaction

1. CD

2. For the reaction

$PCl_5(g) \longrightarrow PCl_3(g) + Cl_2(g)$

The forward reaction at constant temperature is favoured by
(A) introduced an inert gas at constant volume
(B) introducing chlorine gas at constant volume
(C) introducing an inert gas at constant pressure
(D) increasing the volume of the container

2. CD

3. For dissociation of a gas N_2O_5 at $N_2O_5(g) \rightleftharpoons 2NO_2(g) + \frac{1}{2}O_2(g)$. The reaction is performed at constant temperature and volume. If D is the vapour density of equilibrium mixture, P_o is initial pressure of $N_2O_5(g)$ and M is molecular mass of N_2O_5, then the correct information(s) at the equilibrium is/are

(A) the total pressure of gases at equilibrium is $\frac{P_o.M}{2D}$

(B) the degree of dissociation of $N_2O_5(g)$ is $\frac{M-2D}{3D}$

(C) the partial pressure of $N_2O_5(g)$ at equilibrium is $\frac{(5D-M).P_o}{3D}$

(D) the partial pressure of $O_2(g)$ at equilibrium is $\frac{(M-2D).P_o}{3D}$

3. ABC

4. The position of equilibrium will shift in the given direction by the addition of inert gas at constant pressure in which of the following case(s)?

(A) $N_2(g) + 3F_2(g) \rightleftharpoons 2NF_3(g)$; forward direction

(B) $COCl_2(g) \rightleftharpoons CO(g) + Cl_2(g)$; forward direction

(C) $CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g)$; backward direction

(D) $2C(s) + O_2(g) \rightleftharpoons 2CO(g)$; backward direction

4. BC

5. The equilibrium constant for some reactions are given below against each of the reaction.

(i) $2N_2 + 5O_2 \rightleftharpoons 2N_2O_5; K = 5 \times 10^{-27}$

(ii) $N_2 + O_2 \rightleftharpoons 2NO; K = 2 \times 10^{-15}$

(iii) $N_2 + 2O_2 \rightleftharpoons 2NO_2; K = 1.5 \times 10^{-29}$

Which of the following statement is correct?

(A) The least stable oxide is NO_2 (B) The most stable oxide is NO

(C) The stability order is $N_2O_5 > NO_2 > NO$ (D) The stability order is $NO_2 > NO > N_2O_5$

5. AB

6. Van't Hoff equations show the effect of temperature on equilibrium constants K_C and K_P. K_P and K_C varies with temperature according to which of the following relations?

(A) $\log\frac{K_{P_2}}{K_{P_1}} = \frac{\Delta H}{2.303R}\left[\frac{T_1 - T_2}{T_1T_2}\right]$ (B) $\log\frac{K_{P_2}}{K_{P_1}} = \frac{\Delta H}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$

(C) $\log\frac{K_{C_2}}{K_{C_1}} = \frac{\Delta U}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$ (D) $\log\frac{K_{C_2}}{K_{C_1}} = \frac{\Delta U}{2.303R}\left[\frac{T_1 - T_2}{T_1T_2}\right]$

6. BC

7. At -10°C, the solid compound $Cl_2(H_2O)_8$ is in equilibrium with gaseous chlorine, water vapour and ice. The partial pressure of the two gases in equilibrium with a mixture of $Cl_2(H_2O)_8$ and ice are 0.20 atm for Cl_2 and 0.001 atm for water vapour. The processes may be represented as follows

(i) $Cl_2(H_2O)_8(s) \rightleftharpoons Cl_2(g) + 8H_2O(g); K_{P_1}$

(ii) $Cl_2(H_2O)_8(s) \rightleftharpoons Cl_2(g) + 8H_2O(s); K_{P_2}$

Identify the correct statement among the following regarding the processes

(A) The value of K_{P_1} is 2.0×10^{-25} atm^9

(B) The value of K_{P_2} is 0.2 atm

(C) The vapour pressure of ice is 0.001 atm at 263 K

(D) Process(i) must be exothermic

7. ABC

(Single Correct Choice Type)

This section contains **7 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

8. The equilibrium constant K_P for the reaction

$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ changes if

(A) the total pressure changes (B) a catalyst is used

(C) the amount of H_2 and I_2 change (D) the temperature changes

8. D

9. In the following equilibrium

$I: A + 2B \rightleftharpoons C \quad K_{eq} = K_1$

$II: C + D \rightleftharpoons 3A \quad K_{eq} = K_2$

$III: 6B + D \rightleftharpoons 2C \quad K_{eq} = K_3$

Hence

(A) $3K_1 \times K_2 = K_3$ (B) $K_1^3 \times K_2^2 = K_3$

(C) $3K_1 \times K_2^2 = K_3$ (D) $K_1^3 \times K_2 = K_3$

9. D

10. The equilibrium constants for the reaction $A_2 \rightleftharpoons 2A$ at 500 K and 1000 K are 1×10^{-10} and 1×10^{-5}, respectively. The reaction is
(A) exothermic (B) very slow
(C) very fast (D) endothermic

10. D

11. For the reaction
$2NOBr(g) \rightleftharpoons 2NO(g) + Br_2(g)$
the ratio $\frac{K_P}{P}$ where P is the total pressure of gases at equilibrium and $P_{Br_2} = \frac{P}{9}$ at a certain temperature is
(A) $\frac{1}{9}$ (B) $\frac{1}{81}$
(C) $\frac{1}{27}$ (D) $\frac{1}{3}$

11. B

12. ΔG^o for the reaction $X + Y \rightleftharpoons C$ is -4.606 K Cal at 1000 K. The equilibrium constant for the reverse mode of the reaction is
(A) 100 (B) 10
(C) 0.01 (D) 0.1

12. D

13. The equilibrium concentration of C_2H_4 in the gas phase reaction
$C_2H_4(g) + H_2(g) \rightleftharpoons C_2H_6(g); \Delta H = -32.7\,KCal$ can be increased by
I. Removal of C_2H_6 II. Removal of H_2
III. Decreasing temperature IV. Increasing pressure
(A) I, II (B) I, III
(C) II, III (D) None of these

13. D

14. For the reaction $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$, $K_P = 3.2 \times 10^{-5}$ atm^3. The total pressure of the gaseous product when sufficient amount of reactant is allowed to achieve equilibrium is
(A) 0.02 atm (B) 0.04 atm
(C) 0.06 atm (D) 0.095 atm

14. C

(Paragraph Type)

This section contains **2 paragraphs**. Based upon the paragraphs **2 multiple choice questions** have to be answered. Each of these questions has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Paragraph for Question no. 15 to 16

At 444°C, HI undergoes dissociation to the extent of 22.22% at equilibrium

15. What is the equilibrium constant of the reaction $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ at 444°C?
(A) 50 (B) 0.02
(C) 0.143 (D) 3.14

15. B

16. What is the percentage dissociation of HI at 444°C if the experiment is started with one mole of HI(g) and one mole of I_2(g)?
(A) Less than 22.22% (B) More than 22.22%
(C) Equal to 22.22% (D) Nothing can be said

16. A

Paragraph for Question no. 17 to 18

An amount of 0.20 moles of CO taken in a 2.463 L flask is maintained at 750 K along with a catalyst so that the following reaction can take place $CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g)$. Hydrogen is introduced until the total pressure of the system is 7.5 atm at equilibrium and 0.1 mole of methanol is formed.

17. For the reaction, K_P is
(A) 0.16 atm^{-2} (B) 6.25 atm^{-2}
(C) 0.04 atm^{-2} (D) 1.56 atm^{-2}

17. A

18. For the reaction, K_C is [Given: $(2.463)^2 = 6.07$]
(A) 6.07 M^{-2} (B) 607 M^{-2}
(C) 151.75 M^{-2} (D) 2428 M^{-2}

18. B

SECTION-3 : MATHEMATICS

PART – A

(Multi Correct Choice Type)

This section contains 7 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

1. The Circle $x^2+y^2-2x-4y+1=0$ and $x^2+y^2+4x+4y-1=0$
   (A) touch internally
   (B) touch externally
   (C) have $3x+4y-1=0$ as the common tangent at the point of contact
   (D) have $3x+4y+1=0$ as the common tangent at the point of contact

1. **BC**

2. If one end of a focal chord of the parabola $y^2=4x$ is $(1,2)$, then the other end lies on the curve
   (A) $x^2y+2=0$ (B) $xy+2=0$
   (C) $xy-2=0$ (D) $x^2+xy-y-1=0$

2. ABD

3. Consider the circles $C_1: x^2+y^2=16$ and $C_2: x^2+y^2-12x+32=0$. Which of the following statements is/are correct?
   (A) Number of common tangent to these circles is 3.
   (B) The point P with coordinates (4, 1) lies outside the circle C_1 and inside the circle C_2
   (C) Their direct common tangent intersect at (12, 0)
   (D) Slope of their radical axis is not defined.

3. **ACD**

4. The tangents at the ends of a focal chord of a parabola
   (A) are perpendicular (B) are parallel
   (C) intersect on directrix (D) intersect on the tangent at vertex

4. AC

5. Two circles $x^2+y^2+px+py-7=0$ and $x^2+y^2-10x+2py+1=0$ intersect each other orthogonally then the value of p is
   (A) 1 (B) 2
   (C) 3 (D) 5

5. **BC**

6. The equation of tangent to the parabola $y^2=12x$ which makes an angle of 45° with the line $y=3x+77$ is
   (A) $2x-4y+3=0$ (B) $x-2y+12=0$
   (C) $4x+2y+3=0$ (D) $2x+y-12=0$

6. BC

7. The focus of the parabola is (1, 1) and the tangent at the vertex has the equation x + y = 1. Then
   (A) equation of the parabola is $(x-y)^2=2(x+y-1)$
   (B) equation of the parabola is $(x-y)^2=4(x+y-1)$
   (C) the co-ordinates of the vertex are (1/2, 1/2)
   (D) length of the latus rectum is $2\sqrt{2}$

7. **BCD**

(Single Correct Choice Type)

This section contains **7 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

8. If the distance between directrix and latus rectum of a parabola is 4 units, then length of its latus rectum is
(A) 4 units (B) 8 units
(C) 2 units (D) None of these

8. **B**

9. If the vertex of a parabola be at origin and directrix be x + 5 = 0, then its latus rectum is
(A) 5 (B) 10
(C) 20 (D) 40

9. **C**

10. If L_1 and L_2 are the length of the tangent from (0, 5) to the circles $x^2 + y^2 + 2x - 4 = 0$ and $x^2 + y^2 - y + 1 = 0$ then
(A) $L_1 = 2L_2$ (B) $L_2 = 2L_1$
(C) $L_1 = L_2$ (D) $L_1^2 = L_2$

10. **C**

11. The ratio of the length of a focal chord whose inclination with the axis of parabola is α, to its latus rectum is :
(A) $\text{cosec}^2\alpha$ (B) $\sec^2\alpha$
(C) $\sin^2\alpha$ (D) $\tan^2\alpha$

11. **A**

12. The number of common tangent (s) to the circle $x^2 + y^2 + 2x + 8y - 23 = 0$ and $x^2 + y^2 - 4x - 10y + 19 = 0$ is
(A) 1 (B) 2
(C) 3 (D) 4

12. **C**

13. The focal distance of a point on the parabola $y^2 = 4x$ and above its axis, is 5 units. Its coordinates are
(A) (4, 4) (B) (– 4, 4)
(C) (2, 2) (D) None of these

13. **A**

14. The angle between the two tangents from the origin to the circle $(x-7)^2 + (y+1)^2 = 25$ equals
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$

14. **C**

(Paragraph Type)

This section contains **2 paragraphs**. Based upon the paragraphs **2 multiple choice questions** have to be answered. Each of these questions has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Paragraph for Question no. 15 to 16

$y = x$ is a tangent to the parabola $y = ax^2 + c$

15. If $a = 2$, then the value of c is

(A) $\frac{1}{8}$ (B) $-\frac{1}{2}$

(C) $\frac{1}{2}$ (D) 1

15. A

16. If $(1, 1)$ is the point of contact, then a is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

(C) $\frac{1}{4}$ (D) $\frac{1}{6}$

16. A

Paragraph for Question no. 17 to 18

Three circles are given by

$S_1 \equiv x^2 + y^2 = 4,\ S_2 \equiv (x-4)^2 + (y-4)^2 = 4,\ S_3 \equiv x^2 + y^2 - 6x + 8y + 24 = 0$

17. Centre of that circle which cuts the circles S_1, S_2, S_3 orthogonally is

(A) $\left(\frac{2}{7}, \frac{30}{7}\right)$ (B) $\left(-\frac{30}{7}, \frac{2}{7}\right)$

(C) $\left(\frac{30}{7}, \frac{2}{7}\right)$ (D) $\left(\frac{30}{7}, -\frac{2}{7}\right)$

17. **D**

18. Radius of the circle which cuts the circles S_1, S_2, S_3 orthogonally is

(A) $4\frac{\sqrt{177}}{7}$ (B) $2\frac{\sqrt{177}}{7}$

(C) $\frac{\sqrt{177}}{7}$ (D) $8\frac{\sqrt{177}}{7}$

18. **B**