FIITJEE RET – 2

EXTENDED_2019

IIT-2015 (P1)

DATE: 23.07.2018

Time: 3 hours **Maximum Marks: 264**

INSTRUCTIONS:

A. General

1. This booklet is your Question Paper containing 60 questions.
2. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. Fill in the boxes provided for Name and Enrolment No.
4. The answer sheet, a machine-readable Objective Response (ORS), is provided separately.
5. DO NOT TAMPER WITH / MULTILATE THE ORS OR THE BOOKLET.

B. Filling in the OMR:

6. The instructions for the OMR sheet are given on the OMR itself.

C. Question paper format:

7. The question paper consists of **3 parts (Physics, Chemistry and Mathematics)**. Each part consists of **two sections**.
8. **Section I** contains **8 questions**. The answer to each question is a **single digit integer**, ranging from 0 to 9 (both inclusive).
9. **Section II** contains **10 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE or MORE** are correct.
10. **Section III** contains **2 Match the following** type questions and you will have to match entries in Column I with the entries in Column II

D. Marking Scheme

11. For each question in **Section I**, you will be awarded **4 marks** if you darken ALL the bubble(s) corresponding to the correct answer(s) **ONLY**. In all other cases **zero (0) marks** will be awarded. **No negative marks** will be awarded for incorrect answers in this section.
12. For each question in **Section II**, you will be awarded **4 marks** if you darken ALL the bubble(s) corresponding to the correct answer(s) **ONLY**. In all other cases **zero (0) marks** will be awarded. **–2 marks** will be awarded for incorrect answers in this section.
13. For each question in **Section III**, you will be awarded **2 marks** for each entry in Column I; if you darken ALL the bubble(s) corresponding to the correct answer(s) **ONLY**. In all other cases **zero (0) marks** will be awarded. **–1 marks** will be awarded for incorrect answers in this section.

Don't write / mark your answers in this question booklet.
If you mark the answers in question booklet, you will not be allowed to continue the exam.

NAME: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

ENROLLMENT NO.: ☐☐☐☐☐☐☐☐☐☐

PAPER–I
PART I: PHYSICS
SECTION 1 (Maximum Marks: 32)

- This section contains **EIGHT** questions.
- The answer to each question is a **SINGLE DIGIT INTEGER** ranging from **0 to 9**, both inclusive.
- For each question, darken the bubble corresponding to the correct integer in the ORS.
- Marking scheme:
  - **+4** If the bubble corresponding to the answer is darkened.
  - **0** In all other cases.

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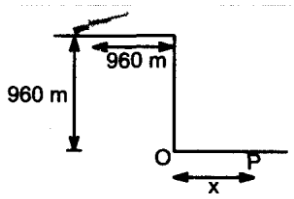
1. The ceiling of a hall is 40 m high. For maximum horizontal distance, the angle at which the ball may be thrown with a speed of 56 m s^{-1} without hitting the ceiling of the hall is $\frac{\pi}{n}$, find the value of n?

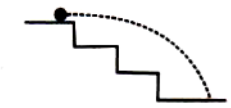
2. The speed of a projectile at its maximum height is $\frac{\sqrt{3}}{2}$ time its initial speed. If the range of the projectile is P times the maximum height attained by it, P is equal to $n\sqrt{3}$. Find the value of n?

3. A gun is mounted on a plateau 960m away from its edge as shown. Height of plateau is 960m. The gun can fire shells with a velocity of 100 m/s at any angle. Of the following choices, what is the minimum distance (OP)x from the edge of plateau where the shell of gun can reach is 160n. Find the value of n?



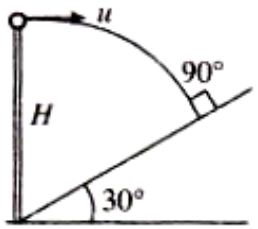
4. In a car race, car A takes 4s less than car B at the finish and passes the finishing with a velocity v more than the car B. Assuming that the cars starts from rest and travel with constant acceleration $a_1 = 4 ms^{-2}$ and $a_2 = 1 ms^{-2}$ respectively, find the velocity of v in ms^{-1}

5. A staircase contains three steps each 10cm high and 20 cm wide. What should be the minimum horizontal velocity of the ball rolling off the uppermost plane so as to hit directly the lowest plane ? ($in ms^{-1}$)



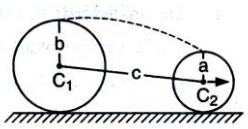
Space for rough work

6. In fig, Find the horizontal velocity $u\left(\text{in } ms^{-1}\right)$ of a projectile so that it hits the inclined plane perpendicularly. Given H= 6.25 m



7. A body is projected up with a speed v_0 along the line of greatest slope of an inclined plane of angle of inclination β .If the body collides elastically perpendicular to the inclined plane, if the time after the body passes through its point of projection is given by $\frac{AV_0}{g\sqrt{B+C\sin^2\beta}}$, Find (A+B+C)

8. The radii of the front and rear wheels of a carriage are a, b respectively and c is the distance between the centres C_1 and C_2 of the wheels. If a particle escapes from the top of a rear wheel and strikes at the top of the front wheel. The time of flight is $\sqrt{\frac{nr}{g}}$, n= ? (b = 3r, a = r)



SECTION 2 (Maximum Marks: 40)

- This section contains **TEN** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct.
- For each question, darken the bubble(s) corresponding to all the correct option(s) in the ORS.
- Marking scheme:
  - **+4** If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
  - **0** If none of the bubbles is darkened.
  - **–2** In all other cases

Space for rough work

9. Two particles are moving with constant velocities $\vec{v}_1$ and $\vec{v}_2$. At $t = 0$, their position vectors with respect to a Cartesian system of coordinates (fixed) are $\vec{r}_{01}$ and $\vec{r}_{02}$, respectively. For this situation mark out the correct statement(s)

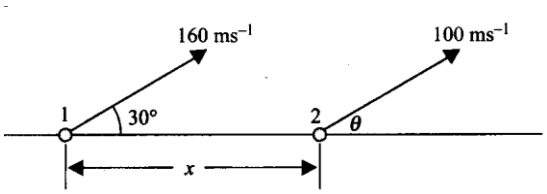
(A) The position vector of 2 with respect to 1 as a function of time is given by $\vec{r} = -\left(\vec{r}_{01} - \vec{r}_{02}\right) - \left(\vec{v}_1 - \vec{v}_2\right)t$.

(B) The position vector of 2 with respect to 1 as a function of time is given by $\vec{r} = \vec{r}_{01} + \left(\vec{v}_1 - \vec{v}_2\right)t$.

(C) The condition for collision of two particles is $\dfrac{\vec{r}_{02} - \vec{r}_{01}}{\left|\vec{a}_{02} - \vec{r}_{01}\right|} = \dfrac{\vec{v}_1 - \vec{v}_2}{\left|\vec{v}_1 - \vec{v}_2\right|}$.

(D) If particles are moving in such a way that they can collide, then time elapsed from its start of motion of collision is $\dfrac{\left|\vec{r}_{02} - \vec{r}_{01}\right|}{\left|\vec{v}_1 - \vec{v}_2\right|}$

10. Suppose two particles 1 and 2 are projected in vertical plane simultaneously. Their angles of projection are 30^0 and θ respectively, with the horizontal. Let they collide after a time t in air. Then



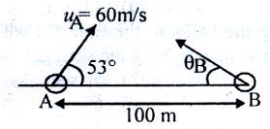
(A) $\theta = \sin^{-1}(4/5)$ and they will have same speed just before the collision

(B) $\theta = \sin^{-1}(4/5)$ and they will have different speed just before the collision

(C) $x < 1280\sqrt{3} - 960\,m$

(D) It is possible that the particles collide when both of them are at their highest point

11. Two particles A and B are projected in same vertical plane as shown in the figure. Their initial positions (t=0), initial speed and angle of projection are indicated in the diagram.



If initial angle of projection θ_B = 37°. What should be initial speed of projection of particle B, so that it hits particle A

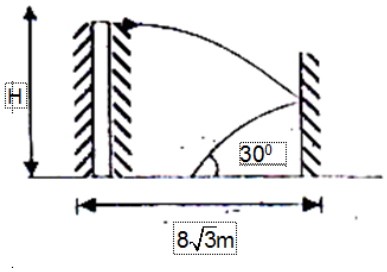
(A) 80 m/s (B) 75 m/s

(C) 40 m/s (D) All the above

.

Space for rough work

12. A ball is thrown horizontally from the top of a tower of unknown height. Ball strikes a vertical wall whose plane is normal to the plane of motion of ball. Collision is elastic and ball falls on ground exactly at the midpoint between the tower and the wall. Ball strikes the ground at an angle of the 30^0 with horizontal. Find the height of the tower (in meter).



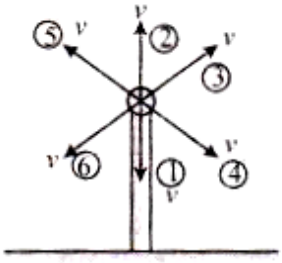
(A) 6 (B) 10 (C) 15 (D) 8

13. Two cities A and B are connected by a regular bus service with buses plying in either direction every T seconds. The speed of each bus is uniform and equal to V_b. A cyclist cycles from A to B with a uniform speed of V_C. A bus goes past the cyclist in T_1 second in the direction A to B and every T_2 second in the direction B to A. Then

(A) $T_1 = \dfrac{V_b T}{V_b + V_c}$ (B) $T_2 = \dfrac{V_b T}{V_b - V_c}$

(C) $T_1 = \dfrac{V_b T}{V_b - V_c}$ (D) $T_2 = \dfrac{V_b T}{V_b + V_c}$

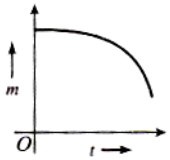
14. All the particles thrown with same initial velocity would strike the ground.



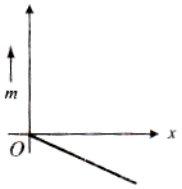
(A) with same speed
(B) simultaneously
(C) time would be least for the particle thrown with velocity v downward i.e., particle 1
(D) time would be maximum for the particle 2

Space for rough work

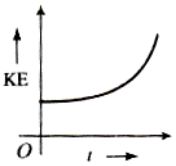
15. A particle is dropped from a tower in a uniform gravitational field at t= 0. Then particle is blown over by a horizontal wind with constant velocity. The slope (m) of the trajectory of the particle with horizontal and its kinetic energy vary according to curves. Here, x is the horizontal displacement and h is height of particle from ground at time t.



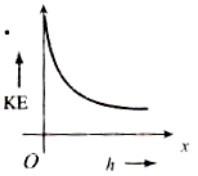
(A)



(B)



(C)

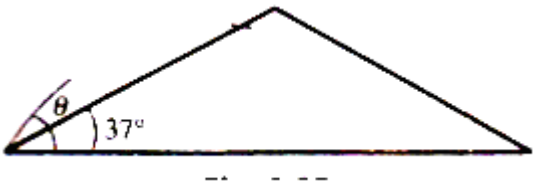


(D)

16. For a particle moving along the x–axis, mark the correct statement(s).
(A) If x is positive and is increasing with the time, then average velocity of the particle is positive
(B) if x is negative and becoming positive after some time, then the velocity of the particle is always positive.
(C) if x is negative and becoming less negative as time passes, then the average velocity of the particle is positive.
(D) If x is positive and is increasing with time, then the velocity of the particle is always positive.

17. A particle is moving along the x –axis whose position is given by $x = 4 - 9t + \frac{t^3}{3}$. Mark the correct statement(s) in relation to its motion
(A) The direction of motion is not changing at any of the instants
(B) The direction of the motion is changing at t= 3s
(C) For 0 < t < 3 s, the particle is slowing down
(D) For 0 < t < 3 s, the particle is speeding up

18. A shot is fired at an angle θ to the horizontal such that it strikes the top of symmetrical hill while moving horizontally. Find the initial angle of projection θ.



(A) $\tan\theta = \frac{2}{3}$ (B) $\tan\theta = \frac{3}{8}$

(C) $\tan\theta = \frac{3}{2}$ (D) None of these

Space for rough work

SECTION 3 (Maximum Marks: 16)

- This section contains **TWO** questions.
- Each question contains two columns, **Column I** and **Column II**
- **Column I** has **four** entries (A), (B), (C) and (D)
- **Column II** has **five** entries (P), (Q), (R), (S) and (T)
- Match the entries in **Column I** with the entries in **Column II**
- One or more entries in **Column I** may match with one or more entries in **Column II**.
- The ORS contains a 4 × 5 matrix whose layout will be similar to the one shown below:

(A)	(P)	(Q)	(R)	(S)	(T)
(B)	(P)	(Q)	(R)	(S)	(T)
(C)	(P)	(Q)	(R)	(S)	(T)
(D)	(P)	(Q)	(R)	(S)	(T)

- For each entry in Column I, darken the bubbles of all the matching entries. For example, if entry (A) in **Column I** matches with entries (Q), (R) and (T), then darken these three bubbles in the ORS. Similarly, for entries (V), (C) and (D).
- Marking entry in Column I.
  - **+2** If only the bubble(s) corresponding to all the correct match (s) is (are) darkened.
  - **0** If none of the bubbles is darkened.
  - **–1** In all other cases.

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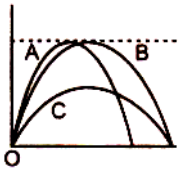
19. Trajectories are shown in figure for three kicked football, initial vertical and horizontal velocity components are u_y and u_x respectively. Ignoring air resistance, choose the correct statement from column – 2 for the value of variable in column – 1



Column – I		Column – II	
(A)	Time of flight	(p)	greatest for A only
(B)	u_y / u_x	(q)	greatest for C only
(C)	u_x	(r)	equal for A and B
(D)	u_x u_y	(s)	equal for B and C
		(t)	None

Space for rough work

20. The path of projectile is represented by $y = Px - Qx^2$

Column – I		Column – II	
(A)	Range	(p)	P/Q
(B)	Maximum height	(q)	P
(C)	Time of flight	(r)	$P^2/4Q$
(D)	Tangent of angle of projection is	(s)	$\sqrt{\frac{2}{Qg}}P$
		(t)	None

PART II: CHEMISTRY

SECTION 1 (Maximum Marks: 32)

- This section contains **EIGHT** questions.
- The answer to each question is a **SINGLE DIGIT INTEGER** ranging from **0 to 9**, both inclusive.
- For each question, darken the bubble corresponding to the correct integer in the ORS.
- Marking scheme:
  - **+4** If the bubble corresponding to the answer is darkened.
  - **0** In all other cases.

21. A sample of ammonium phosphate, $(NH_4)_3PO_4$, contains 3 mol of hydrogen atoms. The number of moles of oxygen atoms in the sample is.

22. The mass of water in grams formed by the reaction between 11.2 L of H_2 and 5.6 L of O_2 at STP is

23. The difference in the oxidation number of the two types of sulphur atoms in $Na_2S_4O_6$ is

24. The volume of 0.25 M H_3PO_3 required to neutralize 25 ml of 0.03M $Ca(OH)_2$ is

25. The n-factor of I_3^- in the reaction
$I_3^- + AsO_3^{3-} \rightarrow I^- + AsO_4^{3-}$

26. How many g of dibasic acid (mol. weight 200) should be present in 100 ml. of the aqueous solution to give strength of 0.1 N?

27. A gaseous alkane C_nH_{2n+2} an explosion with O_2 gives CO_2. The volume of O_2 required for complete combustion of alkane to CO_2 formed is 7 : 4. The value of n is …..

28. 80 mL of M/24 $K_2Cr_2O_7$ solution oxidizes 22.4 mL H_2O_2 solution. The volume strength of H_2O_2 solution is …

Space for rough work

SECTION 2 (Maximum Marks: 40)

- This section contains **TEN** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct.
- For each question, darken the bubble(s) corresponding to all the correct option(s) in the ORS.
- Marking scheme:
  - **+4** If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
  - **0** If none of the bubbles is darkened.
  - **–2** In all other cases

29. For the reaction

$H_3PO_4 + Ca(OH)_2 \longrightarrow CaHPO_4 + 2H_2O$

1 mole 1 mole

then which of the following statements are correct ?

(A) the equivalent weight of H_3PO_4 is 49.

(B) the resulting solution is neutralized by 1 mole of KOH

(C) 1 mole of H_3PO_4 is completely neutralized by 1.5 mole of $Ca(OH)_2$

(D) none

30. Which of the following quantities are dependent on temperature?

(A) Molarity (B) Normality (C) Molality (D) Mole fraction.

31. The oxidation number of C is zero in

(A) HCHO (B) CH_2Cl_2 (C) $C_6H_{12}O_6$ (D) $C_{12}H_{22}O_{11}$

32. 8.7 g of pure MnO_2 is heated with an excess of HCl and gas evolved is passed into a solution of KI. Calculate the amount of the iodine liberated :

(Mn = 55, Cl = 35.5 , I = 127)

$4HCl(aq) + MnO_2(s) \rightarrow 2H_2O(l) + MnCl_2(aq) + Cl_2(g)$

$Cl_2 + 2\ KI \longrightarrow 2\ KCl + I_2$

(A) 0.1 mole (B) 25.4 g (C) 15.4 g (D) 7.7 g

33. $As_2S_3 \longrightarrow AsO_4^{3-} + SO_4^{-2}$

Correct statement is/ are

(A) Eq. wt of $As_2S_3 = \frac{M}{28}$ (B) Eq. wt of $AsO_4^{-3} = \frac{M}{2}$

(C) Eq. wt of $SO_4^{-2} = \frac{M}{8}$

(D) one equivalent of As_2S_3 gives two equivalents of SO_4^{-2}

Space for rough work

34. Which of the following cases concentration of solution is more than 1M
(A) 20g NaOH in 200 ml sol. (B) 160g $Ba(OH)_2$ in 500 ml sol.
(C) 8% w/v NaOH aqueous sol. (D) 20% w/v sol of $Al(NO_3)_3$

35. (i) $2HNO_2 + 2HI \rightarrow 2H_2O + I_2 + 2NO$
(ii) $2KMnO_4 + 3H_2SO_4 + 5HNO_2 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5HNO_3$
Which is NOT true ?
(A) HNO_2 acts as an oxidizing agent in both (B) HNO_2 acts as a reducing agent in both
(C) HNO_2 is oxidizing agent in (i) and reducing agent in (ii)
(D) HNO_2 is reducing agent in (i) and oxidizing agent in (ii)

36. Which one is not correct about $VO + Fe_2O_3 \rightarrow FeO + V_2O_5$?
(A) 2 mole of VO reacts completely with 5 mole of Fe_2O_3
(B) 1 mole of VO reacts completely with 1.5 mole of Fe_2O_3
(C) Eq. weight of V_2O_5 = M/6 and of Fe_2O_3 is M/2
(D) Eq. weight of VO = M/3 and of FeO is 2M / 3

37. Which of the following are disproportionation redox changes ?
(A) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$
(B) $5H_2O_2 + 2ClO_2 + 2OH^- \rightarrow 2Cl^- + 5O_2 + 6H_2O$
(C) $3ClO^- \rightarrow ClO_3^- + Cl^-$
(D) $2HCuCl_2 \xrightarrow[\text{water}]{\text{Dilution with}} Cu + Cu^{2+} + 4Cl^- + 2H^+$

38. For the reaction $N_2 + H_2 \rightarrow 2NH_3$, if molecular mass of NH_3 and N_2 are M_1 & M_2, their equivalent masses are E_1 & E_2, then $E_1 - E_2$ = ____
(A) $2M_1 - 2M_2$ (B) $\frac{2M_1 - M_2}{6}$ (C) $\frac{2M_1 - M_2}{4}$ (D) $2M_2 - M_1$

Space for rough work

SECTION 3 (Maximum Marks: 16)

- This section contains **TWO** questions.
- Each question contains two columns, **Column I** and **Column II**
- **Column I** has **four** entries (A), (B), (C) and (D)
- **Column II** has **five** entries (P), (Q), (R), (S) and (T)
- Match the entries in **Column I** with the entries in **Column II**
- One or more entries in **Column I** may match with one or more entries in **Column II**.
- The ORS contains a 4 × 5 matrix whose layout will be similar to the one shown below:

(A)	(P)	(Q)	(R)	(S)	(T)
(B)	(P)	(Q)	(R)	(S)	(T)
(C)	(P)	(Q)	(R)	(S)	(T)
(D)	(P)	(Q)	(R)	(S)	(T)

- For each entry in Column I, darken the bubbles of all the matching entries. For example, if entry (A) in **Column I** matches with entries (Q), (R) and (T), then darken these three bubbles in the ORS. Similarly, for entries (V), (C) and (D).
- Marking entry in Column I.
  - **+2** If only the bubble(s) corresponding to all the correct match (s) is (are) darkened.
  - **0** If none of the bubbles is darkened.
  - **–1** In all other cases.

39. Match the column

Column – I (Reaction)		Column – II (Equivalent wt of reactant)	
(A)	$NH_3 \longrightarrow NO_3^-$	(P)	M/3
(B)	$FeC_2O_4 \longrightarrow Fe^{3+} + 2CO_3^{2-}$	(Q)	M/6
(C)	$H_2SO_5 \longrightarrow S_8$	(R)	M/8
(D)	$KMnO_4 \xrightarrow{\text{acidic medium}}$	(S)	M/5

40. Match the following

Column – I		Column – II	
(A)	2% aq C_2H_5OH solution (w/v) having density of 1.035 gcm^{-3}.	(P)	2.3 M
(B)	4% aq NaOH solution (w/v)	(Q)	2.55 M
(C)	18% aq H_2SO_4 solution, having density of 1.25 cm^{-3}	(R)	3.47 M
(D)	20% aq H_2SO_4 solution by weight having density of 1.25 cm^{-3}	(S)	1 M

Space for rough work

PART III: MATHEMATICS

SECTION 1 (Maximum Marks: 32)

- This section contains **EIGHT** questions.
- The answer to each question is a **SINGLE DIGIT INTEGER** ranging from **0 to 9**, both inclusive.
- For each question, darken the bubble corresponding to the correct integer in the ORS.
- Marking scheme:
  - **+4** If the bubble corresponding to the answer is darkened.
  - **0** In all other cases.

41. The number of roots of the equation $\sqrt{x-2}\,(x^2 - 4x + 3) = 0$ is

42. If $x = 2 + 2^{2/3} + 2^{1/3}$, then the value of $x^3 - 6x^2 + 6x$ is

43. If the equation $2x^2 + 4xy + 7y^2 - 12x - 2y + t = 0$, where t is a parameter has exactly one real solution of the form (x, y), then the sum of (x + y) is equal to

44. If $p(x) = ax^2 + bx$ and $q(x) = \ell x^2 + mx + n$ with p(1) = q(1); p(2) – q(2) = 1 and p(3) – q(3) = 4, then p(4) – q(4) is

45. The number of roots of the equation $2^x + 2^{x-1} + 2^{x-2} = 7^x + 7^{x-1} + 7^{x-2}$ is

46. If set of values of a for which $f(x) = ax^2 - (3 + 2a)x + 6$, $a \neq 0$ is positive for exactly there distinct negative integral values of x is (c, d], then the value of $(c^2 + 4|d|)$ is equal to

47. Let α and β be the solutions of the quadratic equation $x^2 - 1154x + 1 = 0$, then the value of $\sqrt[4]{\alpha} + \sqrt[4]{\beta}$ is equal to

48. If $a^2 - 4a + 1 = 4$, then the value of $\dfrac{a^3 - a^2 + a - 1}{a^2 - 1}$

Space for rough work

SECTION 2 (Maximum Marks: 40)

- This section contains **TEN** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct.
- For each question, darken the bubble(s) corresponding to all the correct option(s) in the ORS.
- Marking scheme:
  - **+4** If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
  - **0** If none of the bubbles is darkened.
  - **–2** In all other cases

49. Given that α, γ are roots of the equation $Ax^2 - 4x + 1 = 0$, and β, δ the roots of the equation of $Bx^2 - 6x + 1 = 0$, such that α, β, γ and δ are in H.P., then
(A) A = 3 (B) A = 4 (C) B = 2 (D) B = 8

50 Given $|ax^2+bx+c| \leq |Ax^2+Bx+C|$, $\forall x \in R$, $a,b,c\ A,B,C \in R$ and $d=b^2-4ac>0$ and $D=B^2-4AC>0$. Then which of the following statements are true
a) $|a| \leq |A|$ b) $|d| \leq |D|$ c) $|a| \geq |A|$
d) if D, d are not necessarily positive then roots of $ax^2+bx+c=0$ and $Ax^2+Bx+C=0$ may not be equal

51. If both the roots of the equation $x^2-2ax+a^2+a-3=0$ in the variable x are less than 3 then a can be
A) 2 B) 5/2 C) $\sqrt{3}$
D) -7

52. If the equation $ax^2 + bx + c = 0$ and $bx^2 + cx + a = 0$ (a, b, c are unequal non zero real) have a common root then $f(x) = bx^3 + cx^2 + ax - 5$ always passes through fixed point
(A) (1, –5) (B) (0, –5) (C) (–1, –5) (D) (0, 5)

53. If $0 < c < b < a$ and the roots α, β of the equation $cx^2 + bx + a = 0$ are imaginary, then
(A) $\frac{|\alpha|+|\beta|}{2} = |\alpha||\beta|$ (B) $\frac{1}{|\alpha|} = \frac{1}{|\beta|}$ (C) $\frac{1}{|\alpha|}+\frac{1}{|\beta|} < 2$ (D) $\frac{1}{|\alpha|}+\frac{1}{|\beta|} > 2$

Space for rough work

54. Which of the following is correct for quadratic equation $x^2+2(a-1)x+a+5=0$

(A) the equation has +ve roots if $a\in(-5,-1)$

(B) the equation has roots of opposite sign if $a\in(-\infty,-5)$

(C) the equation has (-ve) roots if $a\in[4,\infty)$ (D) none

55. If $0<c<b<a$ and the roots α,β of the equation $cx^2+bx+a=0$ are imaginary, then:

(A) $\frac{|\alpha|+|\beta|}{2}=|\alpha||\beta|$ (B) $\frac{1}{|\alpha|}=\frac{1}{|\beta|}$ (C) $\frac{1}{|\alpha|}+\frac{1}{|\beta|}<2$ (D) None of these

56. If $a_1 < a_2 < a_3 < a_4 < a_5 < a_6$, then the equation $(x-a_1)(x-a_3)(x-a_5)+3(x-a_2)(x-a_4)(x-a_6)=0$ has

(A) three real roots (B) a root in $(-\infty, a_1)$

(C) no real root in (a_1, a_2) (D) no real root in (a_5, a_6)

57. $b^2-\sin^2x+(a-1)(b-2)+1+\sin^4x>0$ for all $x\in R$ and for all $b\in R$ then value of a

(A) $\left(-3-\sqrt{19},0\right)$ (B) $\left(0,\sqrt{19}-3\right)$ (C) $\left(-3-\sqrt{19},\sqrt{19}-3\right)$ (D) R

58. $4x^2-4ax+a^2-2a+2$ has least value 3 in [0, 2], then value of a =

(A) 1 (B) $1-\sqrt{2}$ (C) $5+\sqrt{10}$ (D) 0

SECTION 3 (Maximum Marks: 16)

- This section contains **TWO** questions.
- Each question contains two columns, **Column I** and **Column II**
- **Column I** has **four** entries (A), (B), (C) and (D)
- **Column II** has **five** entries (P), (Q), (R), (S) and (T)
- Match the entries in **Column I** with the entries in **Column II**
- One or more entries in **Column I** may match with one or more entries in **Column II**.
- The ORS contains a 4×5 matrix whose layout will be similar to the one shown below:

(A)	(P)	(Q)	(R)	(S)	(T)
(B)	(P)	(Q)	(R)	(S)	(T)
(C)	(P)	(Q)	(R)	(S)	(T)
(D)	(P)	(Q)	(R)	(S)	(T)

- For each entry in Column I, darken the bubbles of all the matching entries. For example, if entry (A) in **Column I** matches with entries (Q), (R) and (T), then darken these three bubbles in the ORS. Similarly, for entries (V), (C) and (D).
- Marking entry in Column I.

+2 If only the bubble(s) corresponding to all the correct match (s) is (are) darkened.

0 If none of the bubbles is darkened.

–1 In all other cases.

Space for rough work

59. Match the following for the equation $x^2 + a|x| + 1 = 0$, where a is a parameter.

Column I		Column II	
(A)	No real roots	p.	$a < -2$
(B)	Two real roots	q.	ϕ
(C)	Three real roots	r.	$a = -2$
(D)	Four distinct real roots	s.	$a \geq 0$
		t	None of these

60. Match the following

Column I (Number of positive integers for which)		Column II	
(A)	One root is positive and the other is negative for the equation $(m-2)x^2 - (8-2m)x - (8-3m) = 0$	p.	0
(B)	Exactly one root of equation $x^2 - m(2x-8) - 15 = 0$ lies in interval (0, 1)	q.	Infinite
(C)	The equation $x^2 + 2(m+1)x + 9m - 5 = 0$ has both roots negative	r.	1
(D)	The equation $x^2 + 2(m-1)x + m + 5 = 0$ has both roots lying on either sides of 1	s.	2
		t	None of these

Space for rough work

FIITJEE RET – 2

EXTENDED_2019

IIT-2015 (P1)

DATE: 23.07.2018

ANSWERS

PHYSICS

1.	**6**	2.	**4**	3.	**3**	4.	**8**
5.	**2**	6.	**5**	7.	**8**	8.	**8**
9.	**ACD**	10.	**B,C,D**	11.	**A**	12.	**A**
13.	**C,D**	14.	**A,C,D**	15.	**B,C**	16.	**A,C,D**
17.	**B,C**	18.	**C**	19.	**A → r; B → p; C → q; D → s**		
20.	**A → p, B → r, C → s, D → q**						

CHEMISTRY

21.	**1**	22.	**9**	23.	**5**	24.	**3**
25.	**2**	26.	**1**	27.	**2**	28.	**5**
29.	**A, B, C**	30.	**A, B**	31.	**A, B, C, D**	32.	**A, B**
33.	**A, B, C**	34.	**A, B, C.**	35.	**A, B, D**	36.	**A, D**
37.	**C, D**	38.	**B**				
39.	**A → r ; B → p ; C → q; D → s**						
40.	**A → BONUS ; B → s ; C → p; D → q**						

MATHEMATICS

41.	**2**	42.	**2**	43.	**3**	44.	**9**
45	**1**	46.	**4**	47.	**6**	48.	**4**
49.	**A, D**	50	**A,B,D**	51	**C,D**	52	**A,B**
53	**BC**	54	**A,B,C**	55	**B,C**	56	**A**
57.	**C**	58	**B,C**	59.	**A → s; B → r; C → q; D → p**		
60.	**A → p; B → r; C → q; D → p**						