FIITJEE PET – II (EXTENDED)

MAINS

DATE: 28.07.2018

Time: 3 hours **Maximum Marks: 360**

INSTRUCTIONS:

Instructions to the Candidates

1. This Test Booklet consists of **90 questions**.

   Use **Blue/Black ball Point Pen only** for writing particulars and bubbling of OMR.

2. For each correct answer **4 Marks** will awarded and for each wrong answer **1 Mark** will be deducted.

3. Attempt all questions.

4. In case you have not darkened any bubble you will be awarded 0 mark for that question.

5. Use of calculator/logarithmic table is not permitted.

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.: ☐☐☐☐☐☐☐☐☐☐

1. The equation of a line through the point (1, 2) whose distance from the point (3, 1) has the greatest possible value is
(A) $y = x$ (B) $y = 2x$ (C) $y = -2x$ (D) $y = -x$

2. If sum of the distances of a point from two perpendicular lines in a plane is 1, then its locus is
(A) a square (B) a circle (C) a straight line (D) two intersecting lines

3. The point P(1, 1) is translated parallel to $2x = y$ in the first quadrant through a unit distance. the coordinates of the new position of P are
(A) $\left(1\pm\frac{2}{\sqrt{5}},1\pm\frac{1}{\sqrt{5}}\right)$ (B) $\left(1\pm\frac{1}{\sqrt{5}},1\pm\frac{2}{\sqrt{5}}\right)$ (C) $\left(\frac{1}{\sqrt{5}},\frac{2}{\sqrt{5}}\right)$ (D) $\left(\frac{2}{\sqrt{5}},\frac{1}{\sqrt{5}}\right)$

4. The line parallel to the x-axis and passing through the intersection of lines $ax + 2by + 3b = 0$ and $bx - 2ay - 3a = 0$, where $(a, b) \neq (0, 0)$ is
(A) above the x-axis at a distance of $\frac{3}{2}$ units from it
(B) above the x-axis at a distance of $\frac{2}{3}$ units from it
(C) below the x-axis at a distance of $\frac{3}{2}$ units from it
(D) below the x-axis at a distance of $\frac{2}{3}$ units from it

5. Equations of diagonals of square formed by lines $x = 0$, $y = 0$, $x = 1$ and $y = 1$ are
(A) $y = x$, $y + x = 1$ (B) $y = x$, $x + y = 2$ (C) $2y = x$, $y + x = \frac{1}{3}$ (D) $y = 2x$, $y + 2x = 1$

6. If $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = \begin{vmatrix} a_1 & b_1 & 1 \\ a_2 & b_2 & 1 \\ a_3 & b_3 & 1 \end{vmatrix}$, then the two triangles with vertices (x_1, y_1), (x_2, y_2), (x_3, y_3) and (a_1, b_1), (a_2, b_2), (a_3, b_3) are
(A) equal in area (B) similar (C) congruent (D) none of these

7. The straight lines $7x - 2y + 10 = 0$ and $7x + 2y - 10 = 0$ form an isosceles triangle with the line $y = 2$. Area of this triangle is equal to
(A) $\frac{15}{7}$ sq. units (B) $\frac{10}{7}$ sq. units (C) $\frac{18}{7}$ sq. units (D) none of these

Space for rough work

8. Solution of $\frac{(x-3)(x+5)(x-7)}{|x-4|(x+6)} \le 0$ is

(A) $(-6, -5] \cup [3, 7]$ (B) $[3, 7]$
(C) $(-6, -5] \cup [3, 4) \cup (4, 7]$ (D) none of these

9. If $f(x) = \sqrt{\log_{1/2}(x^2 - 2x + 2)}$, then domain of f(x) is

(A) R (B) {1} (C) R^+ (D) {2}

10. If the function f: $[1, \infty) \to (1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is

(A) $\left(\frac{1}{2}\right)^{x(x-1)}$ (B) $\frac{1}{2}\left[1 + \sqrt{1 + 4\log_2 x}\right]$ (C) $\frac{1}{2}\left(1 - \sqrt{1 + 4\log_2 x}\right)$ (D) not defined

11. If $f(x) = \cos|x| + \left[\left|\frac{\sin x}{2}\right|\right]$, (where [.] denotes greatest integer function) then f(x) is

(A) even (B) odd
(C) even and off simultaneously (D) none of these

12. The number of solutions of the equation $|\sin x| = |x|$ is

(A) 2 (B) 0 (C) 1 (D) 4

13. If $f(x) = \sqrt{\log_{x^2} x}$, then the domain of f(x) is

(A) R^+ (B) $R - \{1\}$ (C) $R^+ - \{1\}$ (D) none of these

14. If $f(x) = \frac{1}{\sqrt{(x+1)(e^x - 1)(x-4)(x+5)(x-6)}}$, then the domain of f(x) is

(A) $(-\infty, -5) \cup (-1, 4) \cup (6, \infty)$ (B) $(-\infty, -5) \cup (-1, 0) \cup (0, 4) \cup (6, \infty)$
(C) $(-5, -1) \cup (0, 4) \cup (6, \infty)$ (D) none of these

15. If $f(x) = \frac{3x+2}{5x-3}$, then

(A) $f^{-1}(x) = f(x)$ (B) $f^{-1}(x) = -f(x)$ (C) $f(f(x)) = -x$ (D) none of these

Space for rough work

16. Let f(x) = min {x, x^2}, then $f\left(\frac{1}{2}\right)$

(A) $\frac{1}{2}$ (B) $\pm\frac{1}{2}$ (C) $\frac{1}{4}$ (D) 1

17. If $f(x) = \begin{cases} -1 & x < 0 \\ 0 & x = 0 \\ 1 & x > 0 \end{cases}$ and g(x) = x $(1 - x^2)$, then fog(x) = 0 for k number of values, then k

(A) 0 (B) 1 (C) 2 (D) 3

18. If f(x) is defined on [0, 1], then the domain of f(tan x) is

(A) $\left[n\pi, n\pi + \frac{\pi}{4}\right] n \in Z$ (B) $\left[2n\pi, 2n\pi + \frac{\pi}{4}\right] n \in Z$

(C) $\left[n\pi - \frac{\pi}{4}, n\pi + \frac{\pi}{4}\right] n \in Z$ (D) none of these

19. Domain of $\cos^{-1}[2x^2 - 3]$ (where [.] denotes greatest integer function) is

(A) $\left[1, \sqrt{\frac{5}{2}}\right]$ (B) $\left[-\sqrt{\frac{5}{2}}, -1\right]$ (C) $\left[-\sqrt{\frac{5}{2}}, -1\right] \cup \left[1, \sqrt{\frac{5}{2}}\right]$ (D) none of these

20. Solution of $0 < |x - 3| \le 5$ is

(A) [–2, 8] (B) [–2, 3) $\cup$ (3, 8] (C) [–2, 3) (D) none of these

21. Solution of $\frac{(x-3)(x+5)(x-7)}{|x-4|(x+6)} \le 0$ is

(A) (–6, –5] $\cup$ [3, 4) $\cup$ (4, 7] (B) [3, 7]

(C) (–6, –5] (D) [3, 4) $\cup$ (4, 7]

Space for rough work

22. If $f(x) = \sin^{-1}\left(\frac{x^2}{1+x^2}\right)$, then the range of f(x) is

(A) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ (B) $\left[0,\frac{\pi}{2}\right]$ (C) $\left[0,\frac{\pi}{2}\right)$ (D) $\left[-\frac{\pi}{2},0\right)$

23 A line $ax+by+3=0$ is intersecting the co-ordinate axis at point A and B. If A is (–2, 0) then

(A) $a=\frac{3}{2}$ (B) $a=\frac{2}{3}$ (C) $b=\frac{3}{2}$ (D) $b=\frac{2}{3}$

24. A straight line L with positive slope passes through the point (–8, 2) and cuts the axes at points P and Q. Then the minimum value of the length OP + OQ is

(A) 16 (B) 14 (C) 20 (D) 18

25. The vertex C of an isosceles right angled triangle ABC ($\angle C = 90°$) lies on the line y = x and B is (3, 1) then circumcentre, orthocenter, centroid are respectively :

(A) $(2,2),\left(\frac{7}{3},3\right),(3,4)$ (B) $(2,2),(3,4),\left(\frac{7}{3},3\right)$

(C) $(2,2),\left(\frac{7}{3},\frac{7}{3}\right),(3,3)$ (D) $(2,2),(3,3),\left(\frac{7}{3},\frac{7}{3}\right)$

26. The coordinates of points trisecting the line segment joining (1, –2) and (–3, 4) are

(A) $\left(-\frac{1}{3},0\right),\left(2,\frac{-5}{3}\right)$ (B) $\left(0,-\frac{1}{3}\right),\left(\frac{-5}{3},2\right)$ (C) $\left(-\frac{1}{3},0\right),\left(\frac{-5}{3},2\right)$ (D) $\left(0,-\frac{1}{3}\right),\left(2,\frac{-5}{3}\right)$

27. A triangle ABC with vertices $A(-1,0),B\left(-2,\frac{3}{4}\right)$ & $C\left(-3,\frac{-7}{6}\right)$ has its orthocentre H. Then the orthocentre of ΔBCH will be

(A) (3, 4) (B) (0, -1) (C) (-1, 3) (D) None

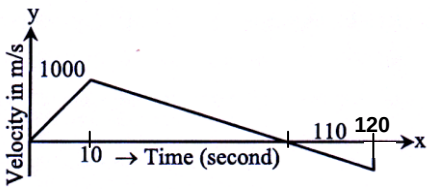
Space for rough work

28. Line AB : x + y – 1 = 0 cuts the axes at A&B. Line CD : 2x – 2y – 1 =0 cuts axes at C&D. Line joining B to C cuts line AD at R. Then locus of R is
(A) $x^2+y^2=x+y$ (B) $x^2+y^2=x-y$ (C) $x^2+y^2+x+y=0$ (D) $x^2+y^2+x-y=0$

29. The locus of point of intersection of the line $x\cos\alpha+y\sin\alpha=a$ and $x\sin\alpha-y\cos\alpha=b$, where α is a variable is
(A) $x^2+y^2=a^2-b^2$ (B) $x^2-y^2=a^2+b^2$ (C) $x^2+y^2=a^2+b^2$ (D) $x^2+y^2=a^2b^2$

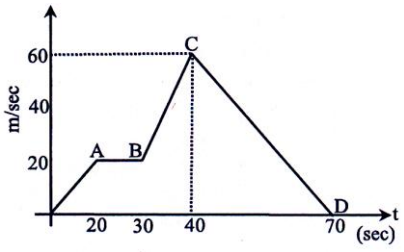
30. A straight line through A(1, 2) makes an angle $\tan^{-1}\left(\frac{4}{3}\right)$ with positive direction of x-axis in anticlock wise sense. The points on the straight line whose distance from A is ±5 units are
(A) (4, 2), (–2, –4) (B) (4, 6), (–2, –6) (C) (4, 2), (–6, –2) (D) (4, 2), (–2, –6)

31. Adjacent graph shows the variation of velocity of a rocket with time. Find the time of burning of fuel from the graph
(A) 10 sec
(B) 110 sec
(C) 120 sec
(D) cannot be estimated from the graph

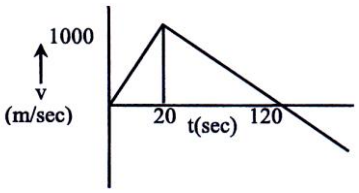


32. The following shows the time-velocity graph for a moving object. The maximum acceleration will be

(A) 1 m/sec^2 (B) 2 m/sec^2
(C) 3 m/sec^2 (D) 4 m/sec^2

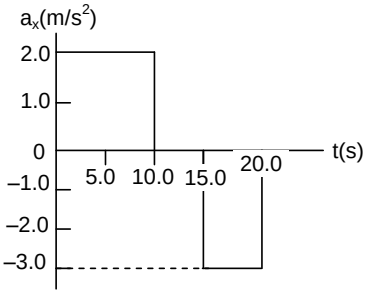


33. A rocket is projected vertically upwards and its time-velocity graph is shown in the figure. The maximum height attained by the rocket is
(A) 1 km (B) 10 km
(C) 100 km (D) 60 km



Space for rough work

34. A particle starts from rest and accelerates as shown in the graph (figure). Determine the distance travelled in the first 20s.



(A) 242.5 m (B) 262.5 m
(C) 162.5 m (D) none of these

35. A point moves in the plane x–y according to the law x = 4 sin 2t and y = 4(1 – cos 2t) where k and ω are positive constants. Find the distance s traversed by the particle during time 5 s.
(A) 10 m (B) 20 m (C) 40 m (D) 120 m

36. A man can swim in still water with a speed of 2 ms^{-1}. If he wants to cross a river of water current speed $\sqrt{3}$ ms^{-1} along shortest possible path, then in which direction should he swim?
(A) At an angle 120^0 to the water current (B) At an angle 150^0 to the water current
(C) At an angle 90^0 to the water current (D) None of these

37. A policeman moving on a highway with a speed of 30 kmh^{-1} fires a bullet at thief's car speeding away in the same direction with a speed of 192 kmh^{-1}. If the muzzle speed of the bullet is 150 ms^{-1}, with what speed does the bullet hit the thief's car?
(A) 120 ms^{-1} (B) 90 ms^{-1} (C) 125 ms^{-1} (D) 105 ms^{-1}

38. Rain, driven by the wind, falls on a railway compartment with a velocity of 20 ms^{-1}, at an angle of 30^0 to the vertical. The train moves, along the direction of wind flow, at a speed of 108 kmh^{-1}. Determine the apparent velocity of rain for a person sitting in the train
(A) $20\sqrt{7}$ ms^{-1} (B) $10\sqrt{7}\,ms^{-1}$ (C) $15\sqrt{7}\,ms^{-1}$ (D) $10\sqrt{7}\,kmh^{-1}$

39. A man swimming downstream overcomes a float at a point M. After traveling distance D he turned back and passed the float at a distance of D/2 from the point M, then the ratio of speed of swimmer with respect to still water to the speed of the river will be
(A) 1 (B) 2 (C) 3 (D) 4

Space for rough work

40. Wind is blowing in the north direction at speed of 2 ms^{-1}, which causes the rain to fall at some angle with the vertical. With what velocity should a cyclist drive so that the rain appears vertical to him
(A) 2 ms^{-1} south (B) 2 ms^{-1} north (C) 4 ms^{-1} west (D) 4 ms^{-1} south

41. A man holds an umbrella at 30^0 with the vertical to keep himself dry. He, then, runs at a speed of 10 ms^{-1}, and find the rain drops to be hitting vertically. Study the following statements and find the correct options.
i. Velocity of rain wr..t. Earth is 20 ms^{-1}
ii. Velocity of rain w.r.t. man is $10\sqrt{3}\,ms^{-1}$
iii. Velocity of rain w.r.t. Earth is 30 ms^{-1}
iv. Velocity of rain w.r.t. man is $10\sqrt{2}\,ms^{-1}$
(A) Statements (i) and (ii) are correct (B) Statements (i) and (iii) are correct
(C) Statements (iii) and (iv) are correct (D) Statements (ii) and (iv) are correct

42. Rain appears to fall vertically to a man walking at 3 kmh^{-1} but when he changes his speed to double, the rain appears to fall at 45^0 with vertical. Study the following statements and find which of them are correct.
i. Velocity of rain is $2\sqrt{3}$ kmh^{-1}
ii. The angle of fall of rain (with vertical) is $\theta = \tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$
iii. The angle of fall of rain (with vertical) is $\theta = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$
iv. Velocity of rain is $3\sqrt{2}\,kmh^{-1}$
(A) Statements (i) and (ii) are correct (B) Statements (i) and (iii) are correct
(C) Statements (iii) and (iv) are correct (D) Statements (ii) and (iv) are correct

43. Raindrops are hitting the back of a man walking at a speed of 5 kmh^{-1}. If he now starts running in the same direction with a constant acceleration, the magnitude of the velocity of the rain with respect to him will
(A) Gradually increase (B) Gradually decrease
(C) First decrease then increase (D) First increase then decrease

44. Two trains are moving with velocities v_1 = 10 ms^{-1} and v_2 = 20 ms^{-1} on the same track in opposite directions. After the application of brakes if their retarding rates are a_1 = 2 ms^{-2} and a_2 = 1 ms^{-2} respectively, then the minimum distance of separation between the trains to avoid collision is
(A) 150 m (B) 225 m (C) 450 m (D) 300 m

Space for rough work

45. When a man moves down the inclined plane with a constant speed 5 ms^{-1} which makes an angle of 37^0 with the horizontal, he finds that the rain is falling vertically downward. When he moves up the same inclined plane with the same speed, he finds that the rain makes an angle $\theta = \tan^{-1}\left(\frac{7}{8}\right)$ with the horizontal. The speed of the rain is

(A) $\sqrt{116}\,ms^{-1}$ (B) $\sqrt{32}\,ms^{-1}$ (C) 5 ms^{-1} (D) $\sqrt{73}\,ms^{-1}$

46. A glass wind screen whose inclination with the vertical can be changed is mounted on a car. The car moves horizontally with a speed of 2 ms^{-1}. The angle α with the vertical at which the wind screen must be placed so that the rain drops, falling vertically downwards with velocity 6 ms^{-1}, strike the wind screen normally

(A) $\sin^{-1}\left(\frac{1}{3}\right)$ (B) $\cos^{-1}(3)$ (C) $\tan^{-1}\left(\frac{1}{3}\right)$ (D) $\tan^{-1}(3)$

47. Two particles A and B are thrown up simultaneously from the edge of a cliff with initial speeds v and 2v. Assuming that the particle A comes to rest immediately after striking the ground, the variation in relative position of the particle B with respect to the particle A with time, till both the stones strike the ground is plotted. This variation plot is

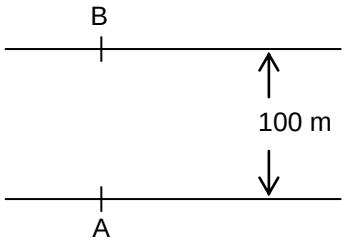
(A) only linear (B) only parabolic
(C) first parabolic then linear (D) first linear then parabolic

48. Ship A is traveling with a velocity of 5 kmh^{-1} due east. A second ship is heading 30^0 east of north. What should be the speed of second ship if it is to remain always due north with respect to the first ship?

(A) 10 kmh^{-1} (B) 9 kmh^{-1} (C) 8 kmh^{-1} (D) 7 kmh^{-1}

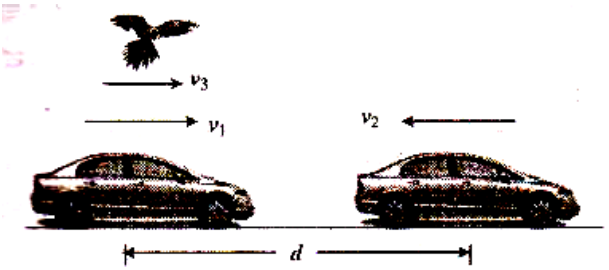
49. A man swims from a point A on one bank of a river of width 100 m. When he swims perpendicular to the water current, he reaches the other bank 50m downstream. The angle to the bank at which he should swim, to reach the directly opposite point B on the other bank is

(A) 10^0 upstream (B) 20^0 upstream
(C) 30^0 upstream (D) 60^0 upstream



Space for rough work

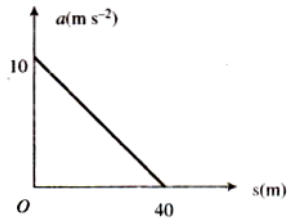
50. A bird flies to and fro between two cars which moves with velocities v_1 and v_2. If the speed of the bird is v_3 and the initial distance of separation between them is d, find the total distance covered by the bird till the cars meet.



(A) $\frac{dv_2}{v_1+v_3}$ (B) $\frac{dv_1}{v_2+v_3}$ (C) $\frac{dv_3}{v_1+v_2}$ (D) None

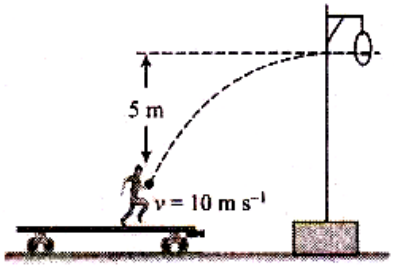
51. A balloon in ascending vertically with an acceleration of $1 ms^{-2}$. Two stones are dropped from it at an interval of 2 s. The distance between them 1.5 s after the second stone is released is
(A) 33 m (B) 44 m (C) 55 m (D) 66 m

52. Referring to a–s diagram as shown in fig, the velocity of the particle when the particle just covers 20 m $\left(v_0 = \sqrt{50}\, ms^{-1}\right)$ is



(A) $\sqrt{325}\, ms^{-1}$ (B) $\sqrt{350}\, ms^{-1}$ (C) $\sqrt{425}\, ms^{-1}$ (D) $\sqrt{450}\, ms^{-1}$

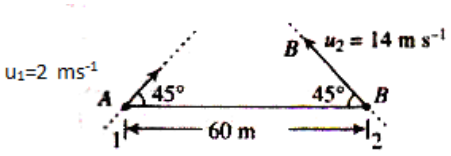
53. A man is standing on a rail road car travelling with a constant speed of $v = 10 ms^{-1}$ fig. He wishes to throw a ball through a stationary hoop 5 m above the height of his hands in such a manner that the ball will move horizontally as it passes through the hoop. He throws the ball with a speed of 12.5 ms^{-1} w.r.t himself.



How many seconds after he releases the ball will it pass through the hoop
(A) 1 second (B) 2 seconds (C) 4 seconds (D) None

Space for rough work

54. Two particles are located on a horizontal plane at a distance 60 m. At t=0 both particles are simultaneously projected at angle 45^0 with velocities $2ms^{-1}$and $14\ ms^{-1}$, respectively. The minimum separation between them during the motion is

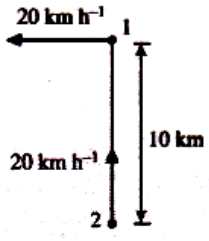


(A) 26 m (B) 36 m (C) 16 m (D) 10 m

55. Three particles A, b and C as situated at the vertices of an equilateral triangle of side r at t= 0. The particle A heads towards B, B towards C, C towards A with constant speeds v, the time of the their meeting is

(A) $\frac{3\ell}{2v}$ (B) $\frac{5\ell}{2v}$ (C) $\frac{2\ell}{5v}$ (D) $\frac{2\ell}{3v}$

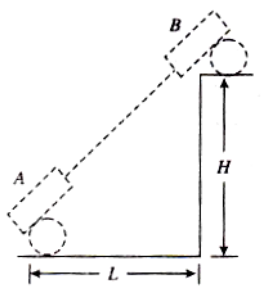
56. Two ships are 10 km apart on a line joining south to north. The one father north is steaming west at 20 km h^{-1}. The other is steaming north at 20 km h^{-1}. The distance of closest approach is



(A) $3\sqrt{2}$km (B) $5\sqrt{2}$km (C) $10\sqrt{2}$km (D) None

Space for rough work

57. Cannon A is located on a plain a distance L from a wall of height H. On top of this wall is an identical cannon (cannon B). Ignore air resistance through out this problem. Also ignore the size of the cannons relative to L and H. The two groups of gunners aim the cannons directly at each other. They fire at each other simultaneously, with equal muzzle speed v_0.



What is the value of v_0 for which the two cannon balls collide just as they hit the ground ?

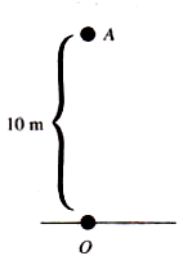
(A) $V_0 = \sqrt{\frac{g\left(L^2+H^2\right)}{4H}}$ (B) $V_0 = \sqrt{\frac{g\left(L^2-H^2\right)}{4H}}$

(C) $V_0 = \sqrt{\frac{4H}{g\left(L^2-H^2\right)}}$ (D) None

58. An airplane is observed by two observers traveling at 60 kmh^{-1} in two vehicles moving in opposite directions on a straight road. To an observer in one vehicle, the plane appears to cross the road track at right angles while to the other appears to be 45^0. At what angle does the plane actually cross the road track

(A) $\tan^{-1}(2)$ (B) $\tan^{-1}(4)$ (C) $\tan^{-1}\left(\frac{1}{3}\right)$ (D) $\tan^{-1}\left(\frac{1}{2}\right)$

59. A helicopter is moving vertically upwards with a velocity $5ms^{-1}$. When the helicopter is at a height 10 m from ground, a stone is thrown with a velocity $\left(3\hat{i}+4\hat{j}\right)ms^{-1}$ from the helicopter w.r.t the man in it. Considering the point on ground vertically below the helicopter as the origin of coordinates, and the ground below as xy plane, find the coordinates of the point where the stone will fall, assuming helicopter moves upwards with constant velocity.



(A) (3,4) (B) (6,8) (C) (12,16) (D) (1,2)

Space for rough work

60. A truck is moving with a constant velocity of $54\ kmh^{-1}$. In which direction (angle with direction of motion of truck) should a stone be projected up with a velocity of $20ms^{-1}$, from the floor of the truck, so as to appear at right angles to the truck, for a person standing on earth ?

(A) $\cos^{-1}\left(-\frac{3}{4}\right)$ (B) $\cos^{-1}\left(-\frac{1}{4}\right)$

(C) $\cos^{-1}\left(\frac{2}{3}\right)$ (D) $\cos^{-1}\left(\frac{3}{4}\right)$

61. If λ_0 and λ be the threshold wavelength and the wavelength of incident light, the velocity of photo–electrons ejected from the metal surface is :

(A) $\sqrt{\frac{2h}{m}(\lambda_0-\lambda)}$ (B) $\sqrt{\frac{2hc}{m}(\lambda_0-\lambda)}$ (C) $\sqrt{\frac{2hc}{m}\left(\frac{\lambda_0-\lambda}{\lambda\lambda_0}\right)}$ (D) $\sqrt{\frac{2h}{m}\left(\frac{1}{\lambda_0}-\frac{1}{\lambda}\right)}$

62. Identify the correct statement

(A) The ratio of the radius of Be^{+3} ion in 3^{rd} energy level to that of He^{+} ion in 2^{nd} energy level is '9'.

(B) Most of α–particles are deplected backwards through angles greater than 90°

(C) The (e/m) ratio for cathode rays is fixed whose value is 1.76×10^{11} C/kg

(D) A body can radiate (or) absorb energy in whole number of a quantum hv, 2hv, 3hv… nhv where "n" is the negative integer.

63. Which of the following statement is correct.

(A) In hydrogen atom, energy of first excited state is –3.4 eV. Then, KE of same orbit of hydrogen atom is + 3.4 ev.

(B) The work function for a metal is 4 eV. To emit a photo electron of zero velocity from the surface of the metal, the wavelength of incident light should be 3100 A°.

(C) The first emission in the atomic spectrum of hydrogen in the Balmer series a…. at $\frac{9R_H}{400}cm^{-1}$

(D) Both A & B are correct

64. A dust particle having mass equal to 10^{-11} g, diameter of 10^{-4} cm and velocity 10^{-4} cm sec^{-1}. The error in measurement of velocity is 0.1%. Calculate uncertainty in its position.

(A) 5.27×10^{-6} m (B) 6.27×10^{-6} m (C) 7.27×10^{-6} m (D) 8.27×10^{-6} m

65. The velocity of electron in a certain Bohr's orbit of H atom bears the ratio 1 : 275 to the velocity of light. The number of waves made by electron during one complete revolution round this orbit is…

(A) 2 (B)4 (C) 6 (D) 8

Space for rough work

66. A certain transition in H–spectrum from an excited state to ground state in one or more steps gives rise to a total of ten lines. How many of these belong to visible spectrum ?
(A) 3 (B) 4 (C) 5 (D) 6

67. The set of quantum numbers which can explain the last electron in $3d^6$ configuration is
(A) n = 3, l = 2, m = 0, $s = +\frac{1}{2}$ (B) n = 3, l = 2, m = ±2, $s = \pm\frac{1}{2}$
(C) n = 3, l = 1, m = – 1, $s = -\frac{1}{2}$ (D) n = 3, l = 2, m = +1, $s = \pm\frac{1}{2}$

68. The number of d–electrons in Fe^{2+} is not equal to that of the
(A) p–electrons in Ne (B) s–electrons in Mg
(C) d–electrons in Fe (D) p–electrons in Cl^-

69. If the shortest wavelength of H–atom in Lyman series is X. Then longest wavelength in Balmer series for He^+ is
(A) $\frac{9x}{5}$ (B) $\frac{36x}{5}$ (C) $\frac{x}{4}$ (D) $\frac{5x}{9}$

70. Orbital angular momentum for an electron in 2s orbital is
(A) 0 (B) $\frac{h}{2\pi}$ (C) $\sqrt{6}\frac{h}{2\pi}$ (D) $\sqrt{2}\frac{h}{2\pi}$

71. If ground state of hydrogen atom is chosen as zero potential energy level. The value of total energy in the first excited state (in eV) is
(A) 10.2 (B) 13.6 (C) 3.4 (D) 23.8

72. The frequency of first line of Balmer series in hydrogen atom is v_0. The frequency of corresponding line emitted by singly ionized helium atom is :
(A) $2v_0$ (B) $4v_0$ (C) $v_0/2$ (D) $v_0/4$

73. Angular momentum of an orbit of a H like species in which the electron revolving is 4.2197×10^{-34} JS. The number of waves made by the electron in that orbit.
(A) 6 (B) 4 (C) 8 (D) 2

74. If the kinetic energy of a particle is doubled, the deBroglie wave length becomes
(A) 2 times (B) 4 times (C) $\sqrt{2}$ times (D) $\frac{1}{\sqrt{2}}$ times

Space for rough work

75. The ratio of de–Broglie's wavelengths of protons accelerated through the potentials of 25V and 100 V is
(A) 1 : 2 (B) 2 : 1 (C) 1 : 4 (D) 4 : 1

76. In photoelectric effect the number of photo–electrons emitted is proportional to :
(A) intensity of incident beam (B) frequency of incident beam
(C) velocity of incident beam (D) work function of photo–cathode

77. Rutherford's experiment, which established the nuclear model of the atom, used a beam of
(A) cathode rays which impinged on a metal foil and got absorbed
(B) anode rays which impinged on a metal foil and ejected electrons
(C) helium atoms, which impinged on a metal foil and got scattered
(D) helium nuclei, which impinged on a metal foil and got scattered

78. The ratio of specific charge ratio of a proton and deuteron is
(A) 1 : 1 (B) 1 : 2 (C) 1: 4 (D) 2 : 1

79. Select the correct relation on the basis of Bohr's theory
(A) Velocity of electron $\alpha \frac{1}{n}$ (B) velocity of electron $\alpha \frac{1}{n^3}$
(C) radius of orbit $\alpha n^2 z$ (D) force on electron $\alpha \frac{1}{n^2}$

80. The difference between 2p and 3p
(A) size of 2p > 3p (B) radial node in 2p > 3p
(C) radial node, size, energy of 3p > 2p (D) energy of 2p > 3p

81. For the following balanced redox reaction,
A $FeS_2 + bO_2 \rightarrow x(Fe_2O_3) + ySO_2$ What is the value of a and b respectively ?
(A) 5, 12 (B) 11, 4 (C) 5, 11 (D) 4, 11

82. For the oxidation reaction, $Fe_{0.95}O \rightarrow Fe_2O_3$, if the molecular wt, of $Fe_{0.95}O$ be M, then the equivalent weight of $Fe_{0.95}O$ will be
(A) $\frac{M}{1}$ (B) $\frac{M}{2}$ (C) $\frac{M}{0.95}$ (D) $\frac{M}{0.85}$

Space for rough work

83. 1 gram of a carbonate of a metal was dissolved in 25 ml of 1N HCl. The resulting liquid required 5 ml of N NaOH for neutralization. The eq. wt. of metal carbonate is :
(A) 100 (B) 30 (C) 40 (D) 50

84. 0.1 mol of MnO_4^- (in acidic medium) cannot :
(A) oxidise 0.5 mol of Fe^{2+} (B) oxidise 0.166 mol of FeC_2O_4
(C) oxidise 0.25 mol of $C_2O_4^{2-}$ (D) oxidise 0.6 mol of $Cr_2O_7^{2-}$

85. In a chemical reaction $K_2Cr_2O_7 + xH_2SO_4 + ySO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + zH_2O$ the values of x, y, z are
(A) 1, 3, 1 (B) 4, 1, 4 (C) 3, 2, 3 (D) 2, 1, 2

86. Oxidation number of S in $H_2S_2O_8$ is
(A) + 2 (B) +4 (C) +6 (D) +7

87. In ground state, an element has 13 electrons in its' 'M' shell. The element is
(A) copper (B) Iron (C) Nickel (D) chromium

88. What is ratio of time periods (T_1/T_2) is second orbit of hydrogen atom to third orbit of He^+ ion ?
(A) 8/27 (B) 32/27 (C) 27/32 (D) 27/8

89. The number of peaks, angular nodes and radial nodes in 4P orbital respectively are
(A) 3, 1, 0 (B) 3, 1, 2 (C) 3, 2, 1 (D) 1, 2, 3

90. The angular momentum of an electron of H–atom is proportional to
(A) r^2 (B) $\frac{1}{r}$ (C) $\sqrt{r}$ (D) $\frac{1}{\sqrt{r}}$

Space for rough work

FIITJEE PET – II (EXTENDED)

MAINS_ANSWERS

DATE: 28.07.2018

MATHEMATICS

1.	**B**	2.	**A**	3.	**B**	4.	**C**
5.	**A**	6.	**A**	7.	**C**	8.	**C**
9.	**B**	10.	**B or D**	11.	**A**	12.	**C**
13.	**C**	14.	**C**	15.	**A**	16.	**C**
17.	**D**	18.	**A**	19.	**D**	20.	**B**
21.	**A**	22.	**C**	23.	**A**	24.	**D**
25	**D**	26.	**C**	27.	**D**	28.	**B (Bonus)**
29.	**C**	30.	**B**				

PHYSICS

31.	**A**	32.	**D**	33.	**D**	34.	**B**
35.	**C**	36.	**B**	37.	**D**	38.	**B**
39.	**C**	40.	**B**	41.	**A**	42.	**C**
43.	**C**	44.	**B**	45.	**B**	46.	**D**
47.	**D**	48.	**A**	49.	**D**	50.	**C**
51.	**C**	52.	**B**	53.	**A**	54.	**B**
55.	**D**	56.	**B**	57.	**A**	58.	**A**
59.	**B**	60.	**A**				

CHEMISTRY

61.	**C**	62.	**C**	63.	**D**	64.	**A**
65.	**A**	66.	**A**	67.	**B**	68.	**D**
69.	**A**	70.	**A**	71.	**D**	72.	**B**
73.	**B**	74.	**D**	75.	**B**	76.	**A**
77.	**D**	78.	**D**	79.	**A**	80.	**C**
81.	**D**	82.	**D**	83.	**D**	84.	**D**
85.	**A**	86.	**C**	87.	**D**	88.	**B**
89.	**B**	90.	**C**				