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Name.: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Date : 04/10/2015

Test No.: 0 8

Subject Code.: 1 1 1

Time : 3 Hrs. **M.M. : 360**

HORIZON TEST SERIES

for

Engineering Entrance Exam. 2016

[Test No. 8]

INSTRUCTIONS FOR STUDENTS

1. Read each question carefully.
2. It is mandatory to use Blue/Black Ball Point Pen to darken the appropriate circle in the answer sheet.
3. Mark should be dark and should complete fill the circle.
4. Rough work must be done on the Question Paper, no additional sheet will be provided for this purpose.
5. Do not use white-fluid or any other rubbing material on answer sheet. No change in the answer once marked.
6. Student cannot use log tables and calculators or any other material in the examination hall.
7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.
8. Each correct answer carries four marks. One mark will be deducted for each incorrect answer from the total score.
9. Before handing over the answer sheet to the invigilator, candidate should check the particulars have been filled and marked correctly.
10. Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.
11. Use of Calculator and other Electronic device is not permitted.

Test No. 8

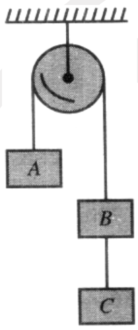
Topics of The Test

Physics	Laws of Motion, Friction and Circular Motion
Chemistry	Solid state
Maths	Circle

Test No. 8

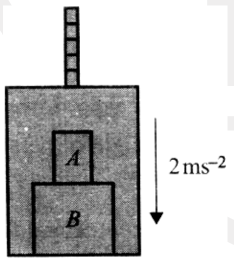
[PHYSICS]

1. There equal weights A,B,C of mass 2 kg each are hanging on a string passing over a fixed frictionless pulley as shown in the figure. The tension in the string connecting weights B and C is



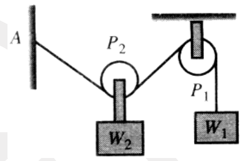
(A) zero (B) 13.06 N
(C) 3.3 N (D) 19.6 N

2. The elevator shown in figure is descending with an acceleration of 2 ms^{-2}. The mass of the block A = 0.5kg. The force exerted by block A on block B is (Take g = 10 m/s^2)



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

3. In the following figure, pulley P_1 is fixed and pulley P_2 is movable. If $W_1 = W_2$ = 100 N, what is the angle AP_2P_1? The pulleys are frictionless.

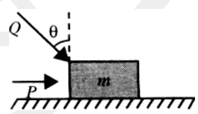


(A) 30° (B) 60°
(C) 90° (D) 120°

4. A man sits on a chair supported by a rope passing over a frictionless fixed pulley. The man who weight 1000 N exerts a force of 450 N on the chair downwards while pulling the rope on the other side. If the chair weight 250 N, then the acceleration of the chair is
(A) 0.45 m/s^2 (B) zero
(C) 2 m/s^2 (D) 9/25 m/s^2

5. A block slides with a velocity of 10 m/s on a rough horizontal surface. It comes to rest after covering a distance of 50 m. If g is 10 m/s^2, then the coefficient of dynamic friction between the block and the surface is
(A) 0.1 (B) 1
(C) 10 (D) 5

6. A block of mass m, lying on a horizontal plane, is acted upon by a horizontal force P and another force Q, inclined at an angle θ to the vertical. The block will remain in equilibrium, if the coefficient of friction between it and the surface is:



(A) $(P + Q\sin\theta)/(mg + Q\cos\theta)$
(B) $(P\cos\theta + Q)/(mg - Q\sin\theta)$
(C) $(P + Q\cos\theta)/(mg + Q\sin\theta)$
(D) $(P\sin\theta - Q)/(mg - Q\cos\theta)$

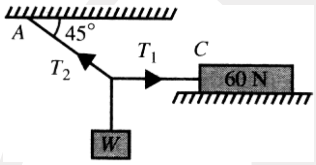
Space for Rough Work

7. A block of mass M is being pulled along rough horizontal surface. The coefficient of friction between the block and the surface is μ. If another block of mass $M/2$ is placed on the block and it is again pulled on the surface, the coefficient of friction between the block and the surface will be :

(A) μ (B) $3\mu/2$

(C) 2μ (D) $5\mu/2$

8. In the figure below, a block of weight 60 N is placed on a rough surface. The coefficient of friction between the block and the surface is 0.5. What should be the weight W such that the block does not slip on the surface?



(A) 60 N (B) $\frac{60}{\sqrt{2}}$ N

(C) 30 N (D) $\frac{30}{\sqrt{2}}$ N

9. Which one is correct ? If a ball of mass 'm' moves away from earth having mass M then

(A) The earth remains stationary while the ball moves upwards.

(B) The ball remains stationary while the earth moves downwards.

(C) The ball earth move towards each other.

(D) The ball and earth both move away from each other.

10. A bird resting on the floor of an airtight box which is being a carried by a boy starts flying. The boy feels that now the box

(A) Is heavier

(B) Is lighter

(C) Shows no change in weight

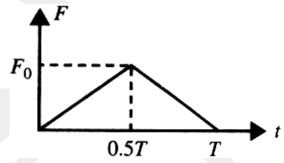
(D) Is lighter in the beginning and heavier later

11. A bunch of n balls each of mass m impinge elastically each second on a surface with velocity u. The average force experienced by the surface will be

(A) mnu (B) $2mnu$

(C) $4mnu$ (D) $mnu/2$

12. A ball of mass m moving with a velocity u rebounds from a wall. The collision is assumed to be elastic and the force of interaction between the ball and wall varies as shown in the figure. Then the value of F_0 is



(A) mu/T (B) $2mu/T$

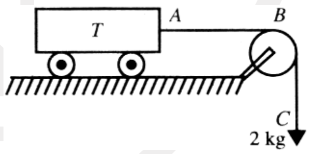
(C) $4mu/T$ (D) $mu/2T$

13. A coin is placed at the edge of a horizontal disc rotating about a vertical axis through its axis with a uniform angular speed 2 rad/s. The radius of the disc is 50 cm. Find the minimum coefficient of friction between disc and coin so that the coin does not slip. g = 10 ms^{-2}

(A) 0.1 (B) 0.2

(C) 0.3 (D) 0.4

14. A trolley T of mass 5 kg on a horizontal smooth surface is pulled by a load of 2 kg through a uniform rope ABC of length 2 m and mass 1 kg. As the load falls from BC = 0 to BC = 2m, its acceleration (in m/s^2) changes from:

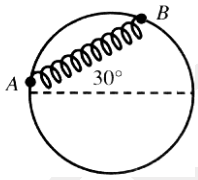


(A) $\frac{20}{6}$ to $\frac{30}{6}$ (B) $\frac{20}{8}$ to $\frac{30}{8}$

(C) $\frac{20}{5}$ to $\frac{30}{6}$ (D) None of these

Space for Rough Work

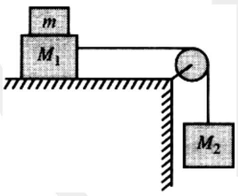
15. A bead of mass m is attached to one end of a spring of natural length R and spring constant $K = \frac{(\sqrt{3}+1)mg}{R}$. The other end of the spring is fixed at point A on a smooth vertical ring of radius R as shown in the figure. The normal reaction at B just after it is released to move is



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

(C) $3\sqrt{3}mg$ (D) $\frac{3\sqrt{3}mg}{2}$

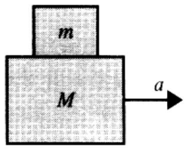
16. Two blocks of masses M_1 and M_2 are connected with a string passing over a pulley as shown in the figure. Block M_1 lies on a horizontal surface. The coefficient of friction between block M_1 and the horizontal surface is μ. The system accelerates. What additional mass m should be placed on block M_1 so that the system does not accelerate ?



(A) $\frac{M_2 - M_1}{\mu}$ (B) $\frac{M_2}{\mu} - M_1$

(C) $M_2 - \frac{M_1}{\mu}$ (D) $(M_2 - M_1)\mu$

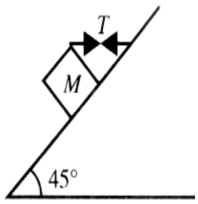
17. A block of mass m is placed on the top of another block of mass M as shown in the figure. The coefficient of friction between them is μ. What is the maximum acceleration with which block M may move so that m alos moves along with it ?



(A) μg (B) g/μ

(C) μ^2/g (D) g/μ^2

18. A block of mass 15 kg is resting on a rough inclined plane as shown in the figure. The block is tied by a horizontal string which has a tension of 50 N. The coefficient of friction between the surface of contact is



(A) 1/2 (B) 2/3

(C) 3/4 (D) 1/4

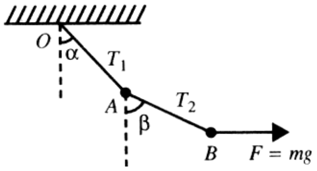
19. A plumb bob is hung from the ceiling of a train compartment. The train moves on an inclined track of inclination 30° with horizontal. Acceleration of train up the plane is $a = g/2$. The angle at which the string supporting the bob makes with normal to the ceiling in equilibrium is

(A) 30° (B) $\tan^{-1}(2/\sqrt{3})$

(C) $\tan^{-1}(\sqrt{3}/2)$ (D) $\tan^{-1}(2)$

Space for Rough Work

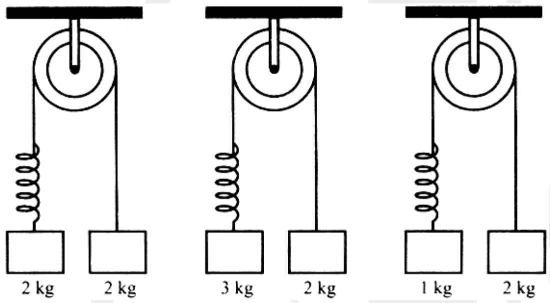
20. Two particles A and B, each of mass m, are kept stationary by applying a horizontal force $F = mg$ on particle B as shown in figure. Then



(A) $2\tan\beta = \tan\alpha$ (B) $\sqrt{2}T_1 = \sqrt{5}T_2$

(C) $T_1 = T_2$ (D) None of these

21. Same spring is attached with 2 kg, 3 kg and 1 kg blocks in three different cases as shown in figure. If x_1, x_2 and x_3 be the extensions of the spring in these cases, then

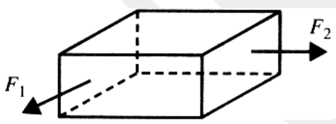


(A) $x_1 = 0, x_3 > x_2$ (B) $x_2 > x_1 > x_3$

(C) $x_3 > x_1 > x_2$ (D) $x_1 > x_2 > x_3$

For Problmes 22-23

A block of mass 10 kg is kept on a rough floor. Coefficient of friction between floor and block are μ_s =0.4 and μ_k =0.3. Forces F_1 =5 N and F_2 = 4 N are applied on the block as shown in the figure.



22. Determine the magnitude of friction force.

(A) $\sqrt{31}$ N (B) $\sqrt{26}$ N

(C) $\sqrt{41}$ N (D) $\sqrt{36}$ N

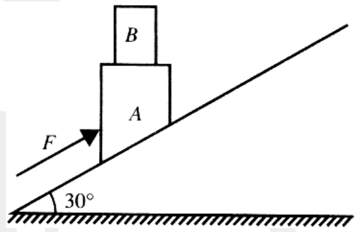
23. If F_1 = 5 N and F_2 = a N, for what maximum value of a, the motion of block impends ?

(A) $\sqrt{1575}$ N (B) $\sqrt{1225}$ N

(C) $\sqrt{1664}$ N (D) $\sqrt{875}$ N

For Problem 24

Block A has mass 40 kg and B 15 kg, and F is 500 N parallel to the smooth inclined plane. The system is moving together.



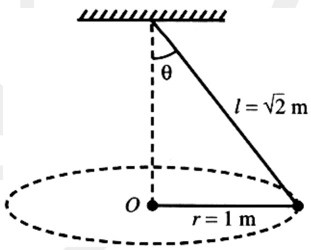
24. The least coefficient of friction between A and B is

(A) $\frac{5\sqrt{2}}{12}$ (B) $\frac{9\sqrt{3}}{53}$

(C) $\frac{9\sqrt{2}}{28}$ (D) $\frac{5\sqrt{3}}{18}$

For Problems 25-26

A sphere of mass 500 g is attached to a string of length $\sqrt{2}m$, whose other end is fixed to a ceiling. The sphere is made to describe a circle of radius 1 m in a horizontal plane.



25. Find the period of revolution for the sphere

(A) $\pi\sqrt{10}$ s (B) $\pi\sqrt{5}$ s

(C) $2\pi\sqrt{10}$ s (D) $\pi/\sqrt{5}$ s

Space for Rough Work

26. Find the tension in the string.

(A) $5\sqrt{2}$ N (B) $10\sqrt{2}$ N

(C) $5\sqrt{3}$ N (D) $10\sqrt{3}$ N

For Problem 27

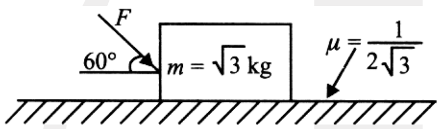
A pail of water is whirled in a circle of radius *r*. At the topmost point the speed of the pail is v_t.

27. Determine the force exerted on water by the pail at the top of the circle.

(A) $\frac{mv^2}{r}+mg$ (B) $\frac{mv_t^2}{r}-mg$

(C) $\frac{2mv_t^2}{r}+mg$ (D) $\frac{mv_t^2}{2r}-mg$

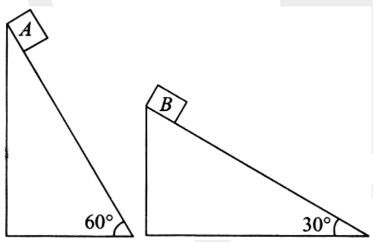
28. What is the maximum value of the force F such that the block shown in the arrangement does not move ?



(A) 20 N (B) 10 N

(C) 12 N (D) 15 N

29. Two fixed frictionless inclined planes making angles 30° and 60° with the vertical are showin in the figure. Two blocks A and B are placed on the two planes. What is the relative vertical acceleration of A with respect to B ?



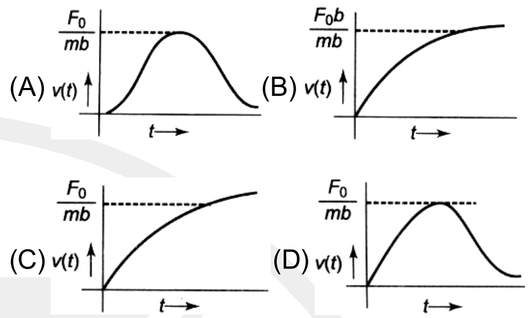
(A) 4.9 m/s^2 in horizontal direction

(B) 9.8 m/s^2 in vertical direction

(C) zero

(D) 4.9 m/s^2 in vertical direction

30. A particle of mass *m* is at rest at the origin at time *t* = 0. It is subjected to a force $F(t)=F_0e^{-bt}$ in the *x* direction. Its speed $v(t)$ is depicted by which of the following curves ?



[CHEMISTRY]

31. Out of V_2O_5 and CoO,

(A) V_2O_5 forms n-type and CoO forms p-type semiconductor

(B) V_2O_5 forms p-type and CoO forms n-type semiconductor

(C) Both form n-type semiconductor

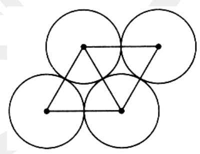
(D) Both form p-type semiconductor

32. Gold crystallises in a cubic closest packed structure (fcc) and has a density 19.3 g cm^{-3}. Thus, radius of gold atom is (Au = 197 g mol^{-1})

(A) 144 pm (B) 288 pm

(C) 72 pm (D) 408 pm

33. Radius of the triangular hole shown in the following figure in terms of radius R of the circle is



(A) 0.1547 R (B) 0.3128 R

(C) 0.414 R (D) 0.2216 R

Space for Rough Work

34. Consider the following transition of iron at 1200 K.

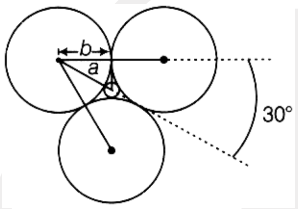
$$\underset{\text{bcc lattice}}{Fe(\alpha - form)} \xrightarrow{1200K} \underset{\text{fcc lattice}}{Fe(\gamma - form)}$$

Distance between the nearest neighbours is same in the two forms at the transition temperature 1200 K. Thus, ratio of the densities of the two forms at 1200 K is

(A) 1.09 (B) 1.00

(C) 0.92 (D) 2.18

35. The cation/anion radius ratio for a triangular arrangement of anions in which the cation is in contact with the anions (but does not push them apart) as shown in the figure is



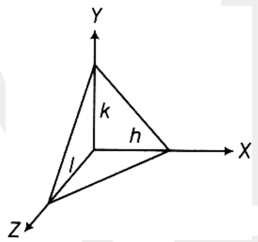
(A) 0.866 (B) 0.414

(C) 0.155 (D) 0.500

36. For a cubic unit cell, the distance d_{hkl} between planes with Miller indices *hkl* is given by

$$d_{hkl}^2 = \frac{a^2}{h^2 + k^2 + l^2}$$

where, *a* is the length of the cubic unit cell.



d_{111} spacing for crystalline K is 0.3080 nm. A wavelength of 0.533 nm falls on this plane. The value of $\sin\theta$ for first order reflection in Bragg's diffraction is

(A) 1.00 (B) 0.50

(C) 0.87 (D) 0.71

37. Sodium metal crystallises in a body centred cubic lattice with a unit cell edge of 4.29Å. The radius of sodium atom is approximately

(A) 0.93Å (B) 1.86Å

(C) 3.22Å (D) 5.72Å

38. CsCl crystallises in body-centred cubic lattice. If 'a' its edge length, then which of the following expressions is correct ?

(A) $r_{Cs^+} + r_{Cl^-} = 3a$

(B) $r_{Cs^+} + r_{Cl^-} = \frac{3a}{2}$

(C) $r_{Cs^+} + r_{Cl^-} = \frac{\sqrt{3}}{2}a$

(D) $r_{Cs^+} + r_{Cl^-} = \sqrt{3}a$

39. Which of the following exists as covalent crystals in the solid state ?

(A) Iodine (B) Silicon

(C) Sulphur (D) Phosphorus

40. Experimentally, it was found that a metal oxide has formula $M_{0.98}O$. Metal *M*, present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be

(A) 7.01% (B) 4.08%

(C) 6.05% (D) 5.08%

41. Lithium forms body-centred cubic structure. The length of the side of its unit cell is 351 pm. Atomic radius of the lithium will be

(A) 75 pm (B) 300 pm

(C) 240 pm (D) 152 pm

42. In a face-centred cubic lattice, atom A occupies the corner positions and atom B occupies the face centred positions. If one atom of B is missing from one of the face centred points, the formula of the compound is

(A) A_2B (B) AB_2

(C) A_2B_2 (D) A_2B_5

Space for Rough Work

43. Copper crystallises in fcc lattice with a unit cell edge of 361 pm. The radius of copper atom is

(A) 181 pm (B) 108 pm

(C) 128 pm (D) 157 pm

44. The edge length of a face-centred cubic cell of an ionic substance is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is

(A) 288 pm (B) 398 pm

(C) 618 pm (D) 144 pm

45. Percentage of free space in cubic close packed structure and in body-centred packed structure respectively are

(A) 30% and 26% (B) 26% and 32%

(C) 32% and 48% (D) 48% and 26%

46. In a compound, atoms of element Y form ccp lattice and those of element X occupy 2/3rd of tetrahedral voids. The formula of the compound will be

(A) X_4Y_3 (B) X_2Y_3

(C) X_2Y (D) X_3Y_4

47. Total volume of atoms present in a face-centred cubic unit cell of a metal is (r is atomic radius)

(A) $\frac{20}{3}\pi r^3$ (B) $\frac{24}{3}\pi r^3$

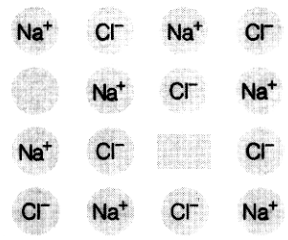
(C) $\frac{12}{3}\pi r^3$ (D) $\frac{16}{3}\pi r^3$

48. An ionic compound has a unit cell consisting of A ions at the corners of a cube and B ions on the centres of the faces of the cube. The empirical formula for this compound would be

(A) A_3B (B) AB_3

(C) A_2B (D) AB

49. What type of crystal defect is indicated in the diagram shown below ?



(A) Frenkel defect

(B) Schottky defect

(C) Interstitial defect

(D) Frenkel and Schottky defects

50. How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1.00 g ?

(Atomic masses of Na = 23, Cl = 35.5)

(A) 2.57×10^{21} (B) 5.14×10^{21}

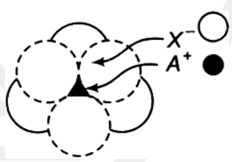
(C) 1.28×10^{21} (D) 1.71×10^{21}

51. Number of atoms in the unit cell of Na (bcc type crystal) and Mg (fcc type crystal) respectively are

(A) 4,4 (B) 4,2

(C) 2,4 (D) 1,1

52. The arrangement of X^- ions around A^+ ion in solid AX is given in the figure (not drawn to scale). If the radius of X^- is 250 pm, the radius of A^+ is

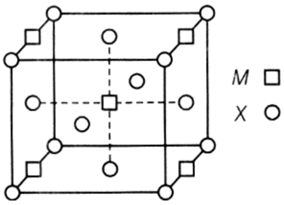


(A) 104 pm (B) 125 pm

(C) 183 pm (D) 57 pm

Space for Rough Work

53. A compound M_pX_q has cubic close packing (ccp) arrangement of X. Its unit cell structure is shown below. The empirical formula of the compound is

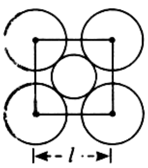


(A) MX (B) MX_2
(C) M_2X (D) M_5X_{14}

54. The unit cell of ammonium chloride is similar to the unit cell of CsCl. Given
$r(Cl^-)$ = 0.181 nm, then $r(NH_4^+)$ is in the range
(A) 0.132 - 0.181 nm (B) 0.075 - 0.132 nm
(C) 0.040 - 0.075 nm (D) None of the above

55. The ionic radius of Mn^{2+} ion is 0.080 nm and that of S^{2-} ion is 0.184 nm. Thus, structure of the cubic unit cell of MnS is of the type
(A) NaCl (B) ZnS
(C) CsCl (D) All of these

56. The packing efficiency of the two-dimensional square unit cell shown below is



(A) 39.27% (B) 68.02%
(C) 74.05% (D) 78.54%

57. A compound contains two types of atoms X and Y. Its crystal structure is cubic lattice with X atoms at the corners of the unit cells and Y atoms at the body centres. The simplest formula is
(A) XY (B) X_2Y
(C) XY_2 (D) XY_3

58. Given, density of NaCl is 2.17×10^3kg m^{-3}. Thus, edge length of NaCl crystal unit cell is
(A) 564 pm (B) 282 pm
(C) 141 pm (D) 56.4 pm

59. Calcium crystallises in a fcc unit cell with a = 0.556 nm. If contained 0.1% Frenkel defect and 0.1% Schottky defect. Density with frenkel defect = d_f and density with Schottky defect = d_s, then
(A) $d_f = d_s$
(B) $d_f > d_s$
(C) $d_f < d_s$
(D) density is not concerned with defect

60. Unit cell of $(BN)_n$, i.e. boron nitride, is similar to that of graphite except that each layer consists of alternating B and N-atoms in hexagonal rings. It crystallises in a hexagonal unit cell with a = 0.251 nm, z = 2 for $(BN)_n$. For graphite, a = 0.2455 nm and distance between C-atoms =0.1415 nm. Thus, distance between B and N-atoms is
(A) 0.1415 nm (B) 0.2500 nm
(C) 0.1450 nm (D) 0.1250 nm

[MATHEMATICS]

61. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points, if
(A) $-85 < m < -35$ (B) $-35 < m < 15$
(C) $15 < m < 65$ (D) $35 < m < 85$

62. The coordinates of the centre of the smallest circle passing through the origin and having $y = x + 1$ as a diameter is
(A) $\left(\frac{1}{2}, -\frac{1}{2}\right)$ (B) $\left(\frac{1}{2}, \frac{1}{3}\right)$
(C) (–1,0) (D) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

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63. The equations of the circle which pass through the origin and makes intercepts of lengths 4 and 8 on the x and y-axes respectively are

(A) $x^2+y^2\pm 4x\pm 8y=0$

(B) $x^2+y^2\pm 2x\pm 4y=0$

(C) $x^2+y^2\pm 8x\pm 16y=0$

(D) $x^2+y^2\pm x\pm y=0$

64. If (3,–2) is the centre of a circle and $4x+3y+19=0$ is a tangent to the circle, then the equation of the circle is

(A) $x^2+y^2-6x+4y+25=0$

(B) $x^2+y^2-6x+4y+12=0$

(C) $x^2+y^2-6x+4y-12=0$

(D) $x^2+y^2-6x+4y+9=0$

65. Centre of circle whose normals are $x^2-2xy-3x+6y=0,$ is

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

(C) $\left(\frac{3}{2},3\right)$ (D) None of these

66. The other end of the diameter through the point (–1,1) on the circle $x^2+y^2-6x+4y-12=0$ is

(A) (–7,5) (B) (–7,–5)

(C) (7,–5) (D) (7,5)

67. If the lines $3x-4y-7=0$ and $2x-3y-5=0$ are two diameters of a circle of area 49π sq unit, the equation of the circle is

(A) $x^2+y^2+2x-2y-62=0$

(B) $x^2+y^2-2x+2y-62=0$

(C) $x^2+y^2-2x+2y-47=0$

(D) $x^2+y^2+2x-2y-47=0$

68. The equation of the circle concentric to the circle $2x^2+2y^2-3x+6y+2=0$ and having area double the area of this circle, is

(A) $8x^2+8y^2-24x+48y-13=0$

(B) $16x^2+16y^2+24x-48y-13=0$

(C) $16x^2+16y^2-24x+48y-13=0$

(D) $8x^2+8y^2+24x-48y-13=0$

69. The equation of the circle passing through (4,5) and having the centre (2,2), is

(A) $x^2+y^2+4x+4y-5=0$

(B) $x^2+y^2-4x-4y-5=0$

(C) $x^2+y^2-4x=13$

(D) $x^2+y^2-4x-4y+5=0$

70. If the lines $2x+3y+1=0$ and $3x-y-4=0$ lie along diameters of a circle of circumference $10\pi,$ then the equation of the circle is

(A) $x^2+y^2-2x+2y-23=0$

(B) $x^2+y^2-2x-2y-23=0$

(C) $x^2+y^2+2x+2y-23=0$

(D) $x^2+y^2+2x-2y-23=0$

71. A circle of radius 5 touches another circle $x^2+y^2-2x-4y-20=0$ at (5,5), then its equation is

(A) $x^2+y^2+18x+16y+120=0$

(B) $x^2+y^2-18x-16y+120=0$

(C) $x^2+y^2-18x+16y+120=0$

(D) None of these

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72. The locus of the centre of a circle of radius 2 which rolls on the outside of the circle, is

$x^2+y^2+3x-6y-9=0$ is

(A) $x^2+y^2+3x-6y+5=0$

(B) $x^2+y^2+3x-6y-31=0$

(C) $x^2+y^2+3x-6y+\frac{29}{4}=0$

(D) None of the above

73. The equation of normal of $x^2+y^2-2x+4y-5=0$ at (2,1) is

(A) $y=3x-5$ (B) $2y=3x-4$

(C) $y=3x+4$ (D) $y=x+1$

74. The equations of the tangents to the circle $x^2+y^2=13$ at the points whose abscissa is 2, are

(A) $2x+3y=13, 2x-3y=13$

(B) $3x+2y=13, 2x-3y=13$

(C) $2x+3y=13, 3x-2y=13$

(D) None of the above

75. From the point P(16,17) tangents PQ and PR are drawn to the cirle $x^2+y^2-2x-4y-20=0$. If C be the centre of the circle, then area of quadrilateral PQCR is

(A) 450 sq units

(B) 15 sq units

(C) 50 sq units

(D) 75 sq units

76. If $\frac{x}{\alpha}+\frac{y}{\beta}$=1 touches the circle $x^2+y^2=a^2$, then point $(1/\alpha, 1/\beta)$ lies on a/an

(A) straight line (B) circle

(C) parabola (D) ellipse

77. If P is a point such that the ratio of the square of the lengths of the tangents from P to the circles $x^2+y^2+2x-4y-20=0$ and $x^2+y^2-4x+2y-44=0$ is 2:3, then the locus of P is a circle with centre

(A) (7,–8) (B) (–7,8)

(C) (7,8) (D) (–7,–8)

78. The radius of the circle, which is touched by the line y = x and has its centre on the positive direction of x-axis and also cuts-off a chord of length 2 unit along the line $\sqrt{3}y-x=0,$ is

(A) $\sqrt{5}$ (B) $\sqrt{3}$

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

79. The length of the common chord of the circles $x^2+y^2+2x+3y+1=0$ and $x^2+y^2+4x+3y+2=0$ is

(A) $\frac{9}{2}$ (B) $2\sqrt{2}$

(C) $3\sqrt{2}$ (D) $\frac{3}{2}$

80. Which of the following is a point on the common chord of the circle $x^2+y^2+2x-3y+6=0$ and $x^2+y^2+x-8y-13=0$?

(A) (1,–2) (B) (1,4)

(C) (1,2) (D) (1,–4)

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81. The equation of the circle whose diameter is the common chord of the circles

$$x^2 + y^2 + 2x + 3y + 2 = 0$$

and $x^2 + y^2 + 2x - 3y - 4 = 0$

(A) $x^2 + y^2 + 2x + 2y + 2 = 0$

(B) $x^2 + y^2 + 2x + 2y - 1 = 0$

(C) $x^2 + y^2 + 2x + 2y + 1 = 0$

(D) $x^2 + y^2 + 2x + 2y + 3 = 0$

82. The equation of the chord of the circle, $x^2 + y^2 = a^2$ having (x_1, y_1) as its mid point, is

(A) $xy_1 + yx_1 = a^2$

(B) $x_1 + y_1 = a$

(C) $xx_1 + yy_1 = x_1^2 + y_1^2$

(D) $xx_1 + yy_1 = a^2$

83. Tangents drawn from the point P(1,8) to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touch the circle at the points A and B. The equation of the circumcircle of the triangle PAB is

(A) $x^2 + y^2 + 4x - 6y + 19 = 0$

(B) $x^2 + y^2 - 4x - 10y + 19 = 0$

(C) $x^2 + y^2 - 2x + 6y - 29 = 0$

(D) $x^2 + y^2 - 6x - 4y + 19 = 0$

84. If P and Q are the points of intersection of the circles $x^2 + y^2 + 3x + 7y + 2p - 5 = 0$

$x^2 + y^2 + 2x + 2y - p^2 = 0$, then there is a circle passing through P,Q and (1,1) for

(A) all values of p

(B) all except one value of p

(C) all except two values of p

(D) exactly one value of p

85. The equation of the circle which cuts orthogonally the circle $x^2 + y^2 - 6x + 4y - 3 = 0$, passes through (3,0) and touches the axis of y is

(A) $x^2 + y^2 + 6x - 6y + 9 = 0$

(B) $x^2 + y^2 - 6x + 6y - 9 = 0$

(C) $x^2 + y^2 - 6x - 6y + 9 = 0$

(D) None of the above

86. The equation of the circle which passes through the points of intersection of the circles $x^2 + y^2 - 6x = 0$ and $x^2 + y^2 - 6y = 0$ and has its centre at $\left(\frac{3}{2}, \frac{3}{2}\right)$ is

(A) $x^2 + y^2 + 3x + 3y + 9 = 0$

(B) $x^2 + y^2 + 3x + 3y = 0$

(C) $x^2 + y^2 - 3x - 3y = 0$

(D) $x^2 + y^2 - 3x - 3y + 9 = 0$

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87. Consider a family of circles, which are passing through the point (–1,1) and are tangent to x-axis. If (h,k) are the coordinates of the centre of the circles, then the set of values of k is given by the interval

(A) $0 < k < \frac{1}{2}$ (B) $k \geq \frac{1}{2}$

(C) $-\frac{1}{2} \leq k \leq \frac{1}{2}$ (D) $k \leq \frac{1}{2}$

88. If (–3,2) lies on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ which is concentric with the circle $x^2 + y^2 + 6x + 8y - 5 = 0$, then c is equal to

(A) 11 (B) –11

(C) 24 (D) 100

89. The coaxial system of circles given by $x^2 + y^2 + 2gx + c = 0$ for $c < 0$ represents

(A) intersecting circles
(B) non-intersecting circles
(C) touching circles
(D) touching or non-intersecting circles

90. The equation of the circle, which cuts orthogonally each of three circles

$$x^2 + y^2 - 2x + 3y - 7 = 0$$

$$x^2 + y^2 + 5x - 5y + 9 = 0$$

and $x^2 + y^2 + 7x - 9y + 29 = 0$

(A) $x^2 + y^2 - 16x - 18y - 4 = 0$

(B) $x^2 + y^2 = a^2$

(C) $x^2 + y^2 - 16x = 0$

(D) $y^2 - x^2 + 2x = 0$

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