FIITJEE PET – I (CHAMPIONS_2ND YEAR)

MAINS

DATE: 09.06.2018

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. Number of integral points lying within the circle $x^2 + y^2 = 36$ is
(A) 104 (B) 109 (C) 130 (D) 110

2. The lines $2x – 3y + 7 = 0$ and $4x – 6y – 5 = 0$ are tangent to the same circle. The radius of the circle is
(A) $\frac{19}{\sqrt{13}}$ (B) $\frac{19}{2\sqrt{13}}$ (C) $\frac{19}{4\sqrt{13}}$ (D) $\frac{19}{8\sqrt{13}}$

3. The circumcentre of the triangle formed by the lines $xy + 2x + 2y + 4 = 0$ and $x + y = 2$ is
(A) (0, 0) (B) (–2, –2) (C) (1, 1) (D) (–1, –2)

4. If the equations of perpendiculars bisectors of the two sides of a triangle is $x + y + 1 = 0$ and $x – y + 1 = 0$, then circumcentre of the circumcircle of the triangle is
(A) (1, 0) (B) (0, 1) (C) (0, –1) (D) (–1, 0)

5. The pair of the lines $k_1x^2 + 2(k_1 + k_2)xy + k_2y^2 = 0$ lies along the diameters of a circle and divide the circle in four sectors such that the area of one sector is three times the area of another sector, then
(A) $3k_1^2 + 3k_2^2 + 2k_1k_2 = 0$ (B) $3k_1^2 + 3k_2^2 – k_1k_2 = 0$
(C) $k_1^2 + k_2^2 + k_1k_2 = 0$ (D) $k_1^2 + k_2^2 – 3k_1k_2 = 0$

6. A and B are the fixed points and P is a variable point and moves in such a manner such that angle APB is always 90°, then the locus of P is a
(A) circle (B) ellipse (C) hyperbola (D) straight line

7. The difference of the maximum and the minimum distance of a point on the line $x + y – 1 = 0$, where it cuts x-axis, with respect to the circle $x^2 + y^2 – 6x – 8y + 24 = 0$ is
(A) 1 (B) 2 (C) $2\sqrt{5}$ (D) $3\sqrt{5}$

8. If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, passes through exactly any three quadrants, then
(A) $c = 0$ (B) $c < 0$ (C) $c > 0$ (D) $c < –1$

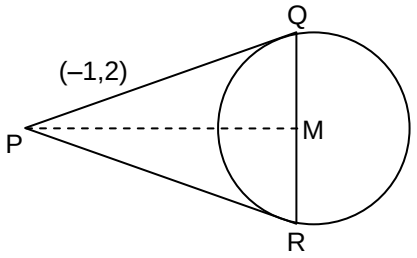
9. The length of the intercept cut off by the circle $x^2 + y^2 – 6x – 4y – 12 = 0$ on the line $4x – 3y + 5 = 0$ is
(A) $\frac{2\sqrt{126}}{5}$ (B) $\frac{4\sqrt{126}}{5}$ (C) $\frac{\sqrt{126}}{5}$ (D) $\frac{3\sqrt{126}}{5}$

10. The radius of the circle passing through the point (8, 2). Two of whose diameters are $x + y = 6$ and $x + 2y = 4$ is
(A) 10 (B) $2\sqrt{5}$ (C) 6 (D) 4

Space for rough work

11. If the lines $x + y + 1 = 0$, $x + 2y + 4 = 0$ and $2x + y + \lambda = 0$ are the diameters of a circle, then λ equals
(A) –1 (B) –2 (C) –3 (D) –4

12. In the figure, area of triangle PQR is
The equation of the circle is C: $x^2 + y^2 - 2x - 4y + 2 = 0$



(A) $\sqrt{3}$ (B) $\frac{\sqrt{3}}{2}$
(C) $\frac{\sqrt{3}}{4}$ (D) $\frac{\sqrt{3}}{8}$

13. If $x + y + 1 = 0$ and $x + y - 1 = 0$ are the two tangents of a circle, then which of following may be the centre of the circle
(A) (1, 1) (B) (2, 2) (C) (0, 0) (D) (5, 4)

14. If the line $3x + 4y + k = 0$ is tangent to $x^2 + y^2 = 25$, then the value of k is
(A) ± 25 (B) ± 25 (C) 25 (D) –25

15. The locus of the point from which two perpendicular tangents can be drawn to the circle $x^2 + y^2 = a^2$ is
(A) $x^2 + y^2 = a^2$ (B) $x^2 + y^2 = 3a^2$ (C) $x^2 + y^2 = 2a^2$ (D) $x^2 + y^2 = 4a^2$

16. The centre and radius of the circle with the segment of the line $x + y = 1$ cut of by the coordinate axes as diameter are
(A) $(1,1),\sqrt{2}$ (B) $\left(\frac{1}{2},\frac{1}{2}\right),\sqrt{2}$ (C) $\left(\frac{1}{2},\frac{1}{2}\right),\frac{1}{\sqrt{2}}$ (D) (0, 0), 1

17. The straight lines joining the origin to the points of intersection of the lines $4x + 3y = 24$ with the curve $(x - 3)^2 + (y - 4)^2 = 25$
(A) are coincident (B) are perpendicular
(C) made equal angles with x-axis (D) none of these

18. A straight line moves such that the algebraic sum of the perpendicular drawn to it from two fixed points is equal to 2k. Then the straight line always touches a fixed circle of radius
(A) 2k (B) $\frac{k}{2}$ (C) k (D) none of these

19. The equation of the image of the circle $x^2 + y^2 - 6x - 4y + 12 = 0$ by the line mirror $x + y - 1 = 0$ is
(A) $x^2 + y^2 + 2x + 4y + 4 = 0$ (B) $x^2 + y^2 - 2x + 4y + 4 = 0$
(C) $x^2 + y^2 + 2x + 4y - 4 = 0$ (D) $x^2 + y^2 + 2x - 4y + 4 = 0$

Space for rough work

20. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. Suppose that the tangents at the point B(1, 7) and D(4, –2) on the circle meet at the point C. The area of the quadrilateral ABCD is
(A) 75 sq. unit (B) 145 sq. unit (C) 150 sq. unit (D) 50 sq. unit

21. An isosceles ΔABC is inscribed in a circle $x^2 + y^2 = a^2$ with the vertex A at (a, 0) and the base angles B and C each equal to 75°, then length of the base BC is
(A) $\frac{a}{2}$ (B) a (C) $\frac{2a}{\sqrt{3}}$ (D) $\frac{\sqrt{3}a}{2}$

22. The point (1, 4) lies inside the circle $x^2 + y^2 - 6x - 10y + p = 0$ which does not touch or intersect the coordinate axes, then
(A) $0 < p < 29$ (B) $25 < p < 29$ (C) $9 < p < 25$ (D) $p < p < 29$

23. If the circle $x^2 + y^2 + 4x + 22y + c = 0$ bisects the circumference of the circle $x^2 + y^2 - 2x + 8y - d = 0$, then c + d is equal to
(A) 60 (B) 50 (C) 40 (D) 56

24. A circle C_1 of radius 2 touches both x-axis and y-axis. Another circle C_2 whose radius is greater than 2 touches circle C_1 and both the axes. Then the radius of circle C_2 is
(A) $6 - 4\sqrt{2}$ (B) $6 + 4\sqrt{2}$ (C) $6 - 4\sqrt{3}$ (D) $6 + 4\sqrt{3}$

25. An equation of a circle touching the axes of coordinates and the line $x \cos\alpha + y \sin\alpha = 2$ is $x^2 + y^2 - 2gx + 2gy + g^2 = 0$ where g =
(A) $2(\cos\alpha + \sin\alpha + 1)^{-1}$ (B) $2(\cos\alpha - \sin\alpha + 1)^{-1}$
(C) $2(\cos\alpha + \sin\alpha - 1)^{-1}$ (D) $-2(\cos\alpha - \sin\alpha - 1)^{-1}$

26. A and B are two fixed points in a plane such that $\frac{PA}{PB} = k$, and locus of point P is a circle, then k will not be equal to
(A) $\frac{1}{2}$ (B) 1 (C) 2 (D) 3

27. If one end of a diameter of the circle $2x^2 + 2y^2 - 4x - 8y + 2 = 0$ is (3, 2) the other end is
(A) (2, 3) (B) (4, –2) (C) (2, –1) (D) (–1, 2)

Space for rough work

28. The triangle PQR is inscribed in the circle $x^2 + y^2 = 25$. If Q and R have coordinates (3, 4) and (–4, 3) respectively, then $\angle QPR$ is equal to

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

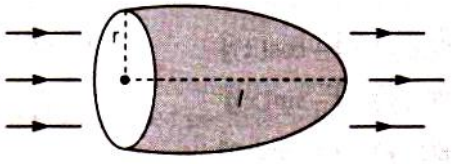
29. If a circle passes through points of intersection of the coordinates axes with the line $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$, then the value of λ is

(A) 1 (B) 2 (C) 3 (D) 4

30. A square is inscribed in the circle $x^2 + y^2 - 2x + 4y + 3 = 0$, whose sides are parallel to the coordinate axes. One vertex of the square is

(A) $\left(1+\sqrt{2},-2\right)$ (B) $\left(1-\sqrt{2},-2\right)$ (C) $\left(1,-2+\sqrt{2}\right)$ (D) none of these

31. Fig. shows a circular surface and a paraboloidal surface. It is placed in a uniform electric field of magnitude E such that the circular surface is oriented at right – angles to the direction of field. Electric flux through the paraboloidal surface is



(A) Zero (B) $\pi r^2 \ell E$ (C) $\frac{1}{2}\pi r^2 \ell E$ (D) $\pi r^2 E$

32. An uniformly charged and infinitely long line having a linear charge density 'λ' is placed at a normal distance y from a point O, Consider a sphere of radius R with O as centre and R >y. Electric flux through the surface of the sphere is :

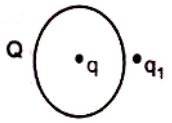
(A) Zero (B) $\frac{2\lambda R}{\varepsilon_0}$ (C) $\frac{2\lambda\sqrt{R^2 - y^2}}{\varepsilon_0}$ (D) $\frac{\lambda\sqrt{R^2 + y^2}}{\varepsilon_0}$

33. An insulating solid sphere of radius 'R' is charged in a non–uniform manner such that volume charge density $\rho = \frac{A}{r}$, Where A is a positive constant and r is the distance from centre. Electric field strength at an y inside point at distance r_1 is :

(A) $\frac{1}{4\pi\varepsilon_0}\frac{4\pi A}{r_1}$ (B) $\frac{1}{4\pi\varepsilon_0}\frac{A}{r_1}$ (C) $\frac{A}{\pi\varepsilon_0}$ (D) $\frac{A}{2\varepsilon_0}$

Space for rough work

34. A thin, metallic spherical shell contains a charge Q on it. A point charge q is place at the centre of the shell and another charge q_1 is placed outside it as show in Fig. All the three charges are positive. The force on the central charge due to the shell is



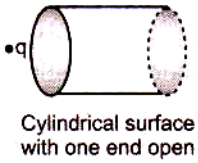
(A) towards left (B) towards right (C) upward (D) zero

35. An infinite plane sheet of aluminium of area A has total charge Q uniformly distributed over its surface. The same charge is spread uniformly on upper surface of glass slab having same face area. The electric field intensities just above the centre of the plates, upper faces are $\vec{E}_1$ and $\vec{E}_2$ for aluminium and glass slabs respectively, then :

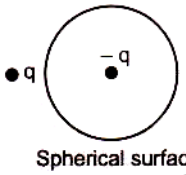
(A) $\left|\vec{E}_1\right| = \left|\vec{E}_2\right|$ (B) $\left|\vec{E}_1\right| = \left|\vec{E}_2\right| = 0$ (C) $\left|\vec{E}_1\right| \neq \left|\vec{E}_2\right|$ (D) cannot say anything

36. In which of the following cases, the flux crossing through the surface is zero ?

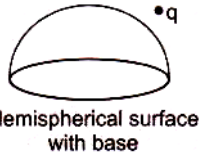
(A)



(B)

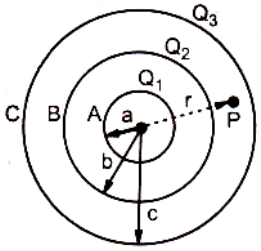


(C)



(D)

37. Three concentric spherical conductors are arranged as shown in the figure. The potential at point P will be



(A) $\frac{1}{4\pi\varepsilon_0}\left[\frac{Q_1}{r}+\frac{Q_2}{r}+\frac{Q_3}{r}\right]$ (B) $\frac{1}{4\pi\varepsilon_0}\left[\frac{Q_1+Q_2}{r}+\frac{Q_3}{c}\right]$

(C) $\frac{1}{4\pi\varepsilon_0}\left[\frac{Q_1}{a}+\frac{Q_2}{b}+\frac{Q_3}{c}\right]$ (D) $\frac{1}{4\pi\varepsilon_0 c}\times\left[Q_1+Q_2+Q_3\right]$

Space for rough work

38. A small hole is cut into a charged hollow conductor of arbitrary shape as shown. If the local surface charge density near the hole is σ, then $\vec{E}$ inside the hole is

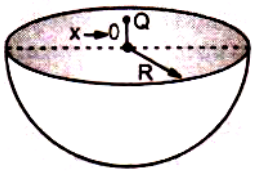
(A) $\frac{\sigma}{\varepsilon_0}$ along outward normal

(B) $\frac{\sigma}{\varepsilon_0}$ along inward normal

(C) $\frac{\sigma}{2\varepsilon_0}$ along outward normal

(D) $\frac{\sigma}{2\varepsilon_0}$ along inward normal

39. A point charge Q is located just above the centre of the flat face of hemisphere as shown in figure. The electric flux through the flat face and curved face of hemisphere are respectively,



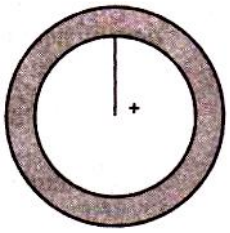
(A) $\frac{Q}{2\varepsilon_0}, -\frac{Q}{2\varepsilon_0}$

(B) $-\frac{Q}{2\varepsilon_0}, \frac{Q}{2\varepsilon_0}$

(C) $\frac{Q}{\varepsilon_0}, -\frac{Q}{\varepsilon_0}$

(D) $-\frac{Q}{\varepsilon_0}, \frac{Q}{\varepsilon_0}$

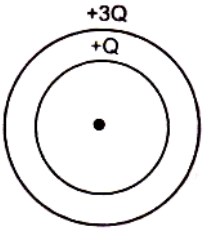
40. An electrically isolated hollow (initially uncharged), conducting sphere has a small positively charged ball suspended by an insulating rod from its inside surface, see diagram. This causes the inner surface of the sphere to become negatively charged. When the ball is centered in the sphere the electric field outside the conducting sphere is approximately.



(A) zero
(B) the same as if the sphere wasn't there
(C) twice what is would be if the sphere wasn't there
(D) Equal in magnitude but opposite in direction to what is would be if the sphere wasn't there.

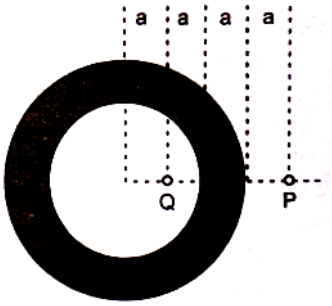
Space for rough work

41. Two concentric conducting thin shells of radius R and 2R carry charges +Q, +3Q respectively. The magnitude of electric field at a distance x outside and inside from the surface of outer sphere is same. Then the value of x is



(A) $\frac{R}{3}$ (B) $\frac{2R}{3}$ (C) $\frac{R}{4}$ (D) $\frac{R}{2}$

42. A solid conducting sphere having net charges Q and radius 3 a contains a hollowed spherical region of radius 2 a. A point charge +Q is place at a position a distance a from the common centre of spheres. What is the magnitude of the electric field at the position r = 4a from the centre of the spheres as marked in the fig by P ?



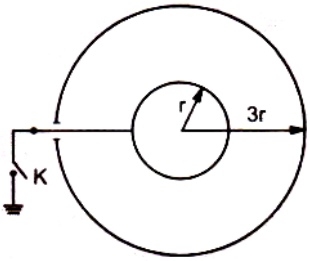
(A) $\frac{kQ}{16a^2}$

(B) $\frac{3kQ}{16a^2}$

(C) $\frac{kQ}{8a^2}$

(D) can't be determined due to non – uniform distribution

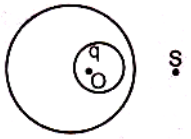
43. Figure shows two conducting thin concentric shells of radii r and 3r. The outer shell carries charges Q and inner shell is neutral. The amount of charge which flows from inner shell to the earth after the key K is closed, is equal to



(A) $-q/3$ (B) $q/3$ (C) 3q (D) –3q

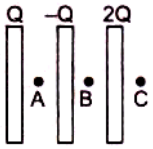
Space for rough work

44. A charge q is placed at O in the cavity in a spherical uncharged conductor. Point S is outside the conductor. If the charge is displaced from O towards S still remaining within the cavity.



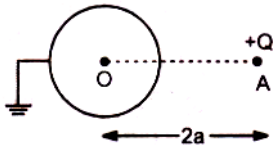
(A) electric field at S will increase
(B) electric filed at S decrease
(C) electric field at S will first increase and then decrease
(D) electric field at S will not change

45. Three large identical conducting parallel plates carrying charges +Q,–Q and +2Q respectively are placed as shown in the figure. If E_A, E_B and E_C refer the magnitude of electric field at point A,B and C respectively then.



(A) $E_A > E_B > E_C$ (B) $E_A = E_B > E_C$
(C) $E_A = 0$ and $E_B < E_C$ (D) $E_A = 0$ and $E_B = E_C$

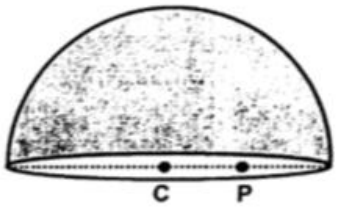
46. A point charge is placed at a distance 2a from the centre of a thin conducting uncharged spherical shell A of radius 'a' as shown in the figure. Then the charge on the shell will be

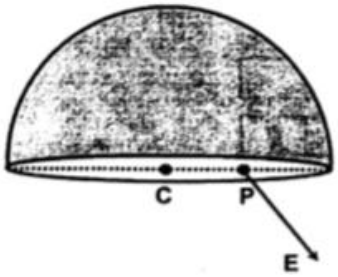


(A) $-\frac{Q}{2}$ (B) Q (C) –Q (D) zero

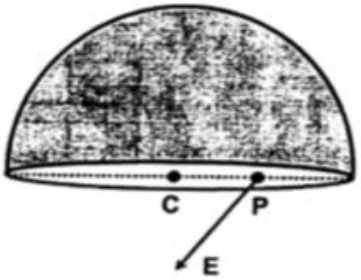
Space for rough work

47. A thin non – conducting hemispherical shell contains a positive charge q on it, which is uniformly distributed on the shell. A point P lies on the diameter of shell as shown in figure. Then the direction of electric field at the point 'P' is

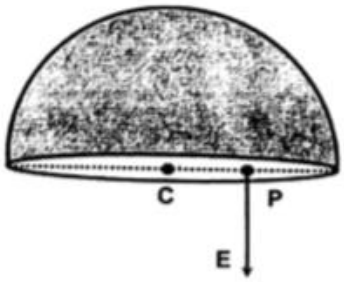




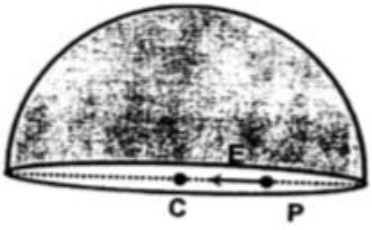
(A)



(B)

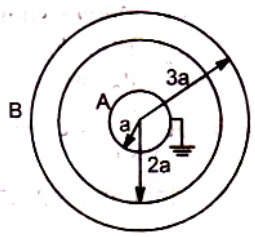


(C)



(D)

48. An uncharged thin conducting spherical shell A of radius 'a' is placed concentrically with a thick conducting spherical shell B of inner radius 2a and outer radius 3a as shown in the figure. If the shell B is given a total charge +Q, then :



(A) Charges on shell A will be $-\frac{Q}{5}$

(B) Charge on shell A will be $\frac{-3}{5}Q$

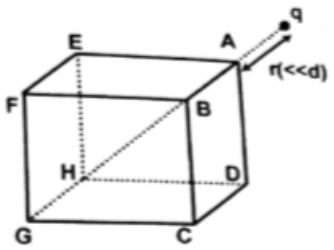
(C) Charge on outer surface of shell B will be $\frac{3Q}{5}$

(D) Charge on outer surface of shell B will be $\frac{Q}{5}$

Space for rough work

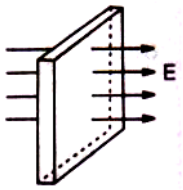
49. For A Gaussian surface : wrong statement is
(A) must not pass through any discrete charge
(B) must pass through any material medium whether conducting or non – conducting
(C) may pass through a continuous charge distribution
(D) may pass through a region where no material medium is present

50. A point charge q is placed on the line AH and just outside the cube (of side d) at a distance of 'r' (r<< d). Total flux of electric field through the surface ABCD (ϕ_{ABCD}) is



(A) $-\frac{q}{8\varepsilon_0}$ (B) $\frac{q}{16\varepsilon_0}$ (C) $\frac{q}{8\varepsilon_0}$ (D) $-\frac{q}{16\varepsilon_0}$

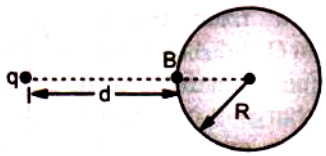
51. An uncharged conducting thin square plate of side 1 m is placed in an uniform electric field of magnitude 200 N/C as shown in the figure. The field direction is perpendicular to the plane of plate. For this situation, mark out the incorrect statement . (in the options only big faces has been considered)



(A) The net charge on each face of the plate is zero
(B) The net charge on each face of the plate is non–zero and having the magnitude equal to $1.77\times10^{-9}\text{C}$.
(C) The net electric field intensity inside the plate is zero.
(D) The electric field intensity at the surface of plate is discontinuous while potential is continuous

Space for rough work

52. For the situation shown in the figure, select the correct statement(s):



(A) Potential of the conductor is $\frac{q}{4\pi\varepsilon_0(d+R)}$

(B) Potential of the conductor is $\frac{q}{4\pi\varepsilon_0 d}$

(C) Potential of the conductor can't be determined as nature of distribution of induced charges is not known.

(D) Potential at point B due to induced charges is $\frac{+qR}{4\pi\varepsilon_0(d+R)d}$

53. Select the incorrect statement(s) w.r.t charge.

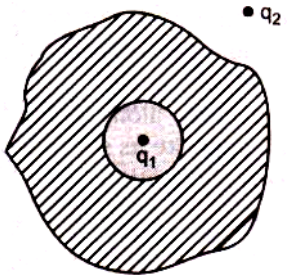
(A) The additive property of charge is not an obvious property, but is related to the fact that charge is a scalar physical quantity

(B) Charge is invariant i.e, its value is same in different frames of reference having relative motion.

(C) Charge is conserved for an electrically isolated system, this can be concluded from the scalar nature of charge.

(D) Charge is conserved for an electrically isolated system, this can't be concluded from scalar nature of charge.

54. A point charge q_1 is placed in a cavity inside a conductor and another point charge q_2 is placed outside it as shown in fig. which of the following statements are correct ?



(A) If q_1 is slightly shifted, the induced charge density on the inner surface of the cavity does not changes.

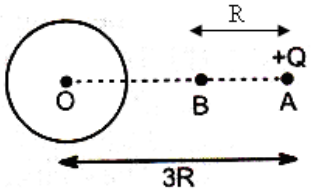
(B) If q_1 is slightly shifted, the induced charge density on the outer surface of the cavity only changes.

(C) If q_2 is slightly shifted, the induced charge density on the inner surface of the cavity only changes.

(D) If q_2 is slightly shifted, the induced charge density on the outer surface of the cavity only changes.

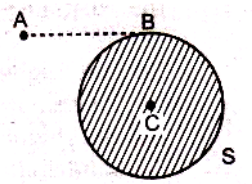
Space for rough work

55. A point charge +Q is placed at point A at a distance 3R from the centre O of an uncharged thin conducting shell of radius R as shown in figure, then the potential (V_B) at point B will be.



(A) $\frac{Q}{4\pi\varepsilon_0 R}$ (B) $> \frac{Q}{4\pi\varepsilon_0 R}$ (C) $< \frac{Q}{4\pi\varepsilon_0 R}$ (D) zero

56. S is solid neutral conducting sphere. A point charge Q of 1×10^{-6}C is place at point A. C is the centre of sphere and AB is a tangent . BC = 3m and AB= 4 m.



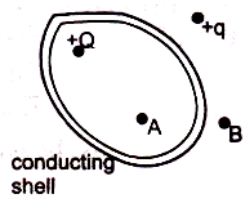
(A) The electric potential of the conductor is 1.58 kV
(B) The electric potential of the conductor is 2.25 kV
(C) The electric potential at B due to induced charges on the sphere is 0.25 kV.
(D) The electric potential at B due to induced charges on the sphere is 0.45 kV.

57. Select the correct options
(A) Gauss's law is valid only for uniform charge distributions
(B) Gauss's law is valid only for charges placed in vaccum
(C) The electric filed calculated by Gauss's law is the field due to all the charges
(D) The flux on the electric field through a closed surface due to all the charges is equal to the flux due to the charges outside of the surface.

58. A conducting sphere of radius r has a charge . Then
(A) The charge is uniformly distributed over its surface, if there is an external electric field.
(B) Distribution of charge over its surface will be non uniform if no external electric field exists in space.
(C) Electric field strength inside the sphere will be equal to zero only when no external electric field exists .
(D) Potential at every point of the sphere must be same

Space for rough work

59. A point charge +Q lies somewhere inside a closed conducting shell as shown in the figure. Another point charge +q lies outside the shell as shown. There are two points A and B, one inside and other outside the shell. Choose correct alternative



(A) When charge +Q is shifted from its position keeping it inside the shell then the charge distribution on inner surface of the shell will change and that on outer surface of shell will remain unchanged.
(B) When charge +q is shifted from is position keeping it outside the shell then the charge distribution on the inner surface of the shell will remain unchanged and that on outer surface will change.
(C) When the charge +Q is shifted from its position keeping it inside the shell then the electric field at B will remain same but that A will change.
(D) All the above.

60. A long straight wire is surrounded by a long metallic cylinder such that axis of cylinder coincides with that of the wire. If wire is having uniform linear charge density λ and cylinder is having charge per unit length of 2λ, then in electrostatic equilibrium condition, the electric field outside the cylinder at a distance r from the axis of cylinder is

(A) $\frac{\lambda}{2\pi\varepsilon_0 r}$ (B) $\frac{2\lambda}{3\pi\varepsilon_0 r}$ (C) $\frac{3\lambda}{2\pi\varepsilon_0 r}$ (D) $\frac{\lambda}{\pi\varepsilon_0 r}$

61. The best reagent for the preparation of pure C_2H_5Cl from Ethanol is
(A) Lucas reagent (B) PCl_5
(C) Thionyl chloride in Pyridine (D) Red Phosphorous + Chlorine

62. $CH_2 = CH_2 + HCl \xrightarrow{X} CH_3 - CH_2Cl$, What is 'X' ?
(A) Al_2O_3 (B) Anhy. $AlCl_3$ (C) NaCl (D) $MgCl_2$

63. $3C_2H_5OH + PCl_3 \rightarrow 3C_2H_5Cl + X$ where 'X' is
(A) H_3PO_2 (B) H_3PO_4 (C) H_3PO_3 (D) $H_4P_2O_7$

64. $C_2H_5OH + SOCl_2 \xrightarrow{\text{Pyridine}} X + Y + Z$ in this reaction X, Y, & Z respectively are
(A) $C_2H_4Cl_2, SO_2, HCl$ (B) C_2H_5Cl, SO_2, HCl
(C) $C_2H_5Cl, SOCl, HCl$ (D) C_2H_4, SO_2, Cl_2

Space for rough work

65. The reaction

$C_6H_6 + CH_3Cl \xrightarrow[(\text{anhydrous})]{AlCl_3} + HCl + C_6H_5CH_3$ is

(A) Friedel – Crafts alkylation (B) Addition reaction
(C) Friedel– Craft's acylation (D) Friedel Craft's benzoylation

66. The solvent used in the preparation of Grignard's reagent is
(A) dry ether (B) dry acetone
(C) dry alcohol (D) dry chloroform

67. Amongst the following the most reactive alkyl halide is
(A) C_2H_5F (B) C_2H_5Cl (C) C_2H_5Br (D) C_2H_5I

68. SN^1 reactions occur through the intermediate formation of
(A) Carbocation (B) Carbanions (C) Free radicals (D) None of these

69. The reaction

$(CH_3)_3C-Br \xrightarrow{H_2O} (CH_3)_3C-OH$ is …… reaction.

(A) elimination (B) substitution (C) free radical (D) displacement

70. An optically active halide when allowed to react with CN^- gives a racemic mixture. The halide is most likely to be
(A) 1° (B) 2° (C) 3° (D) 4°

71. n–propyl bromide on treatment with ethanolic potassium hydroxide produces :
(A) Propane (B) Propene (C) Propyne (D) Propanol

72. Alkyl iodide cannot be prepared by :
(A) $R-CH_2COOAg + I_2 \xrightarrow{CCl_4}$ (B) $R-CH_2-Cl + NaI \xrightarrow{\text{acetone}}$
(C) $R-OH + HI \longrightarrow$ (D) swart reaction

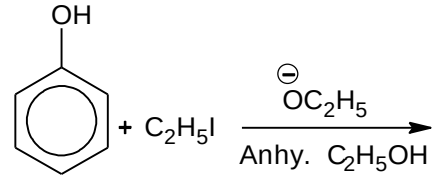
73. Identify the set of reagents/reaction conditions (X) and (Y) in the following set of transformations :

$CH_3-CH_2-CH_2Br \xrightarrow{(X)} Product \xrightarrow{(Y)} (CH_3)_2CH-Br$

(A) (X) = Dilute aqueous NaOH, 20°C (Y) = HBr/acetic acid, 20°C
(B) (X) = Concentrated alcoholic NaOH, 80°C (Y) = HBr/acetic acid, 20°C
(C) (X) = Dilute aqueous NaOH, 20°C (Y) = $Br_2/CHCl_3$, 0°C
(D) (X) = Concentrated alcoholic NaOH, 80°C (Y) = $Br_2/CHCl_3$, 0°C

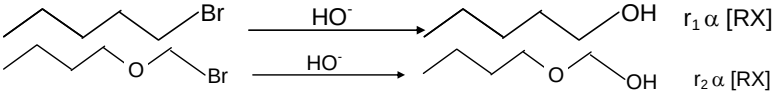
Space for rough work

74.



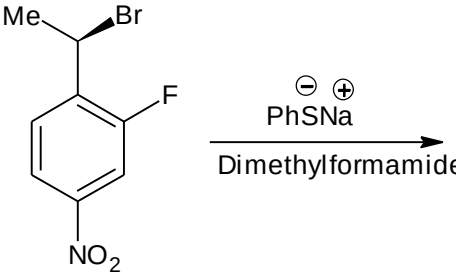
(A) $C_6H_5OC_2H_5$ (B) $C_2H_5OC_2H_5$ (C) $C_6H_5OC_6H_5$ (D) C_6H_5I

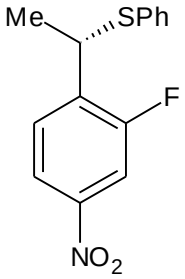
75. The rate expressions for the following reactions are as follows

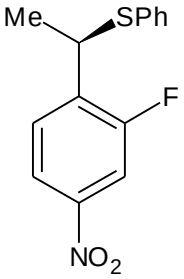


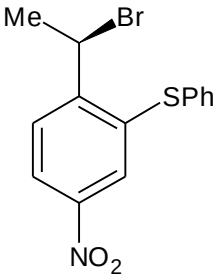
(A) $r_1 > r_2$ (B) $r_1 < r_2$ (C) $r_1 = r_2$ (D) None

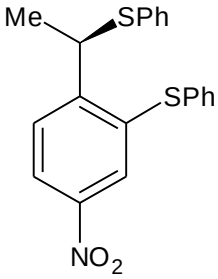
76. The major product of the following reaction is :



(A)


(B)


(C)


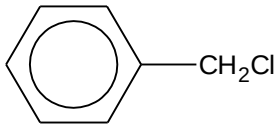
(D)


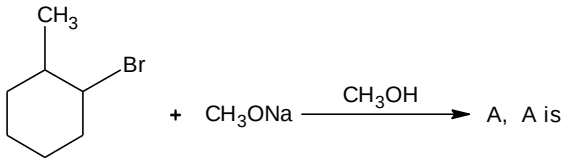
77. Which is highly selective?
(A) chlorination of hydrocarbons (B) bromination of hydrocarbons
(C) both are correct (D) none is correct

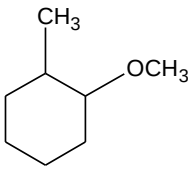
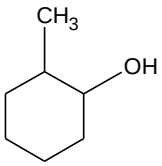
Space for rough work

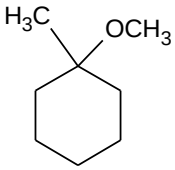
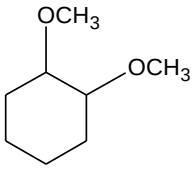
78. Which one of the following is most rapidly hydrolysed by SN1mechanism?

(A) $CH_3CH = CHCl$ (B) $ClCH_2CH = CH_2$

(C)  (D) $(C_6H_5)_3CCl$

79. 

(A)  (B) 

(C)  (D) 

80. Which statement is correct ?

(A) C_2H_5Br reacts with alcoholic KOH to form C_2H_5OH

(B) C_2H_5Br when treated with metallic sodium gives ethane

(C) C_2H_5Br when treated with sodium ethoxide forms diethyl ether

(D) C_2H_5Br with AgCN forms ethyl cyanide

81. The main compound obtained when chlorobenzene is heated with chloral in presence of wn. H_2SO_4

(A) DDT (B) TNT (C) BHC (D) Chloretone

82. Which of the following does not give precipitate when boiled with alcoholic silver nitrate

(A) Allyl halide (B) t–butylchloride (C) Chlorobenzene (D) Benzyl chloride

83. Oxygen reacts with $CHCl_3$ to give a poisonous gas named as

(A) chloral (B) chloroform (C) teargas (D) carbonyl chloride

Space for rough work

84. What will be the reduction product of following reaction .

$$CHCl_3 \xrightarrow[Zn/HCl(a)]{+2H} \xrightarrow[Zn/HCl(92)]{+4H} \xrightarrow[Zn/H_2O]{+6H}$$

(A) CH_2Cl_2, CH_3Cl, CH_4 (B) CH_4, CH_3Cl, CH_2Cl_2
(C) CH_3Cl, CH_2Cl_2, CH_4 (D) CH_3Cl, CH_4, CH_2Cl

85. The hydrogen atom in chloroform is
(A) Acidic (B) Basic (C) Neutral (D) None

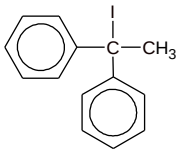
86. Toluene reacts with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is
(A) Electrophilic elimination reaction (B) Electrophilic substitution reaction
(C) Free radical addition reaction (D) Nucleophilic substitution reaction

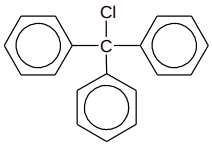
87. Which is correct increasing order of boiling points of the following compounds ?
1–Iodobutane, 1–Bromobutane, 1–Chlorobutane, Butane
(A) Butane < 1–Chlorobutane < 1–Bromobutane < 1–Iodobutane
(B) 1–Iodobutane < 1 – Bromobutane < 1–Chlorobutane < Butane
(C) Butane < 1–Iodobutane < 1–Bromobutane < 1–Chlorobutane
(D) Butane < 1–Chlorobutane < 1–Iodobutane < 1–Bromobutane

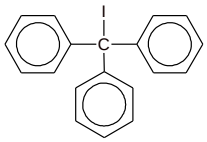
88. $XCH_2CH_2CH_2X \xrightarrow[\text{dry ether}]{Mg} ?$
(A) Cyclohexane (B) cyclopropane (C) hexane (D) propane

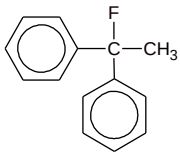
89. $Ph-CH_3 + Cl_2 \xrightarrow{800\ K} Ph-CH_2-Cl + HCl$
This reaction takes place mainly by
(A) SN^1 (B) SN^2 (C) E_1 (D) Free radical

90. In which of the following cases $S_N{}^1$ reaction occurs fastest?

(A) 

(B) 

(C) 

(D) 

Space for rough work

FIITJEE PET – I (CHAMPIONS_2ND YEAR)

MAINS_ANSWERS

DATE: 09.06.2018

MATHEMATICS

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

PHYSICS

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

CHEMISTRY

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