CODE - A

NTPL

PERIODIC TEST

Batch - 2007 [Engg]

Time : 3 Hours ***Maximum Marks : 360***

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

You are not allowed to leave the Examination Hall before the end of the test.

INSTRUCTIONS

A. General :

1. This booklet is your Question Paper containing **90 questions**.
2. The Question Paper **CODE** is printed on the right hand top corner of this booklet. This should be entered on the OMR Sheet.
3. Fill the bubbles completely and properly using a **Blue/Black Ball Point Pen** only.
4. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers, and electronic gadgets in any form are not allowed to be carried inside the examination hall.
5. The answer sheet, a machine-readable Optical mark recognition sheet (OMR Sheet), is provided separately.
6. DO NOT TAMPER WITH / MUTILATE THE OMR OR THE BOOKLET.
7. Do not break the seals of the question-paper booklet before being instructed to do so by the invigilator.

B. Question paper format & Marking Scheme :

8. The question paper consists of **3 parts** (Physics, Chemistry and Maths).
9. The test is of **3 hours** duration. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct. Each question carries **+4 marks** for correct answer and **-1 mark** for wrong answer.

Name of the Candidate (in Capitals) _____

Test Centre _____ Centre Code _____

Candidate's Signature _____ Invigilator's Signature _____

1. The electric potential V at any point (x, y, z) (all in metre) in space is given by $V = 4x^2$ volt. The electric field at the point (1, 0, 2) in V/m is

(a) 16 along + x-axis (b) 8 along neg. x-axis (c) 8 along + x-axis (d) 16 along neg. x-axis

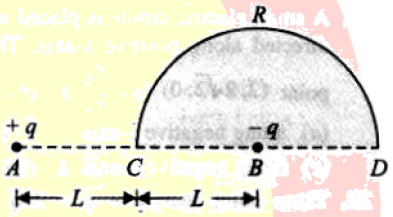
2. Four point charges $-Q$, $-q$, $2q$ and $2Q$ are placed one at each corner of a square. The relation between Q and q for which potential at the centre of square is zero is

(a) $Q = -q$ (b) $Q = -\frac{1}{q}$ (c) $Q = q$ (d) $Q = \frac{1}{q}$

3. In a region, the potential is represented by $V(x, y, z) = 6x - 8xy - 8y + 6yz$, where V is in volt and x, y, z are in meter. The electric force experienced by a charge of 2 C situated at point (1, 1, 1) is

(a) $4\sqrt{35}$ N (b) $6\sqrt{5}$ N (c) 30 N (d) 24 N

4. Charges $+q$ and $-q$ are placed at points A and B respectively, which are at a distance 2 L apart. C is mid point of A and B. Work done in moving a charge $+Q$ along the semicircle CRD, figure, is



(a) $\frac{qQ}{2\pi \in_0 L}$ (b) $\frac{qQ}{6\pi \in_0 L}$

(c) $-\frac{qQ}{6\pi \in_0 L}$ (d) $\frac{qQ}{4\pi \in_0 L}$

5. Two identical charged spheres suspended from a common point by two massless strings of length l, are initially at a distance x ($x << l$) apart because of their mutual repulsion. The charges begin to leak from both the spheres at a constant rate. As a result, the spheres approach each other with a velocity v. Then v varies as a function of distance x between the spheres as

(a) $v \propto x$ (b) $v \propto x^{-1/2}$ (c) $v \propto x^{-1}$ (d) $v \propto x^{1/2}$

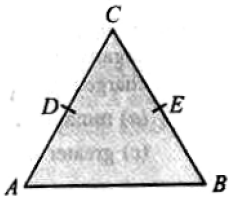
6. The dimensional formula of electric potential is

(a) $[MLT^{-2}A^{-1}]$ (b) $[ML^2T^{-2}A^{-1}]$ (c) $[ML^2T^{-3}A^{-1}]$ (d) $[ML^2T^{-3}A^{-2}]$

7. There is an electric field in x-direction. If work done on moving a charge 0.2 C through a distance of 2 m along a like making an angle of 60° with x-axis is 4.0 J. What is the value of E?

(a) $\sqrt{3}$ N/C (b) 4 N/C (c) 5 N/C (d) None of these

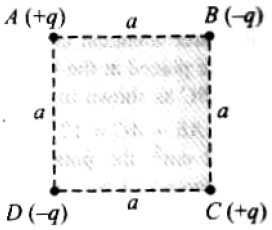
8. Three charges, each $+q$, are placed at the corners of an isosceles triangle ABC of sides BC and $AC = 2a$. D and E are the mid points of BC and CA. The work done in taking a charge Q from D to E is



(a) zero (b) $\frac{3qQ}{4\pi \in_0 a}$

(c) $\frac{3qQ}{8\pi \in_0 a}$ (d) $\frac{qQ}{4\pi \in_0 a}$

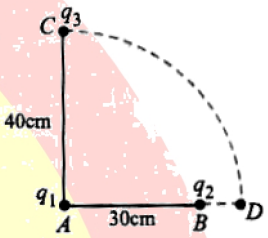
9. There are four point charges $+q$, $-q$, $+q$ and $-q$ placed at the corners A, B, C and D respectively of a square of side a. The potential energy of the system is $\frac{1}{4\pi\varepsilon_0}$ times.



(a) $\frac{q^2}{a}\left(-4+\sqrt{2}\right)$ (b) $\frac{q^2}{2a}\left(-4+\sqrt{2}\right)$

(c) $\frac{4q^2}{a}$ (d) $\frac{-4\sqrt{2}q^2}{a}$

10. Two charges q_1 and q_2 are placed 30 cm apart, as shown in figure. A third charge q_3 is moved along the arc of a circle of radius 40 cm from C to D. The change in the potential energy of the system is $\frac{q_3}{4\pi\in_0}k$, where k is



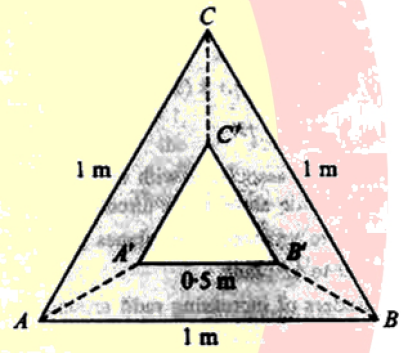
(a) 8 q_2

(b) 6 q_2

(c) 8 q_1

(d) 6 q_1

11. Three point charges of 1C, 2 C and 3 C are placed at corners of an equilateral triangle of side 1 m. Work required to move these charges to the corners of a smaller equilateral triangle of side 0.5 will be



(a) 9.9×10^{10} J

(b) 9.9×10^{9} J

(c) 9.9×10^{8} J

(d) 9.9×10^{11} J

12. A train is moving with a velocity of 30 km h^{-1} due east and a car is moving with a velocity of 40 km h^{-1}. What is the speed and direction of the car as appears to a passenger in the train ?

(a) 50 km h^{-1}, $\tan^{-1}$ (3/4) West of North (b) 40 km h^{-1}, $\tan^{-1}$ (4/3) West of North

(c) 30 km h^{-1}, $\tan^{-1}$ (3/4) East of North (d) 50 km h^{-1}, $\tan^{-1}$ (3/4) East of North

13. Two bullets are fired horizontally from the same height with different velocities. Which bullet will reach the ground first?

(a) faster one (b) slower one

(c) both simultaneously (d) can not be predicted

14. A fighter plane flying horizontally at an altitude of 1.5 km with speed of 720 km h^{-1} passes directly overhead an anticraft gun. At what angle from the vertical should the shell be fired from the gun with muzzle speed 400 ms^{-1} to hit the plane in shortest time?

(a) 90° (b) 60° (c) 45° (d) 30°

15. A cricketer can throw a ball to a maximum horizontal distance of 100 m. How much high above the ground can the cricketer throw the same ball?

(a) 50 m (b) 70 m (c) 100 m (d) 120 m

16. A body is projected with velocity u so that its horizontal range is twice the greatest height attained. The value of range is

(a) $\frac{3u^3}{2g}$ (b) $\frac{2u^2}{5g}$ (c) $\frac{4u^2}{5g}$ (d) $\frac{5u^2}{3g}$

17. For a projectile, projected with velocity u making an angle θ with the horizontal, its range on a horizontal plane is (3/2) times the maximum height attained. Then its range is :

(g is the acceleration due to gravity)

(a) $\frac{24u^2}{35g}$ (b) $\frac{48u^2}{73g}$ (c) $\frac{44u^2}{65g}$ (d) $\frac{48u^2}{78g}$

18. The point from where a ball is projected is taken as the origin of the co-ordinate axes. The x and y components of its displacement are given by $x = 6t$ and $y = 8t - 5t^2$. What is the velocity of projection?

(a) 6 ms^{-1} (b) 8 ms^{-1} (c) 10 ms^{-1} (d) 14 ms^{-1}

19. A ball is thrown upwards at an angle of 60° to the horizontal. It falls on the ground at a distance of 90 m. If the ball is thrown with the same initial velocity at an angle of 30°, it will fall on the ground at a distance of :

(a) 120 m (b) 90 m (c) 60 m (d) 30 m

20. A stone is thrown at an angle θ to the horizontal with speed u. It reaches a maximum height H. The time of flight of this stone is :

(a) $\sqrt{\frac{H}{g}}$ (b) $\sqrt{\frac{2H}{g}}$ (c) $2\sqrt{\frac{2H}{g}}$ (d) $2\sqrt{\frac{2H\sin\theta}{g}}$

21. A projectile is projected with kinetic energy K. Its range is 60 m. It will have minimum KE, after covering a horizontal distance equal to

(a) 60 mm (b) 30 m (c) 45 m (d) 15 m

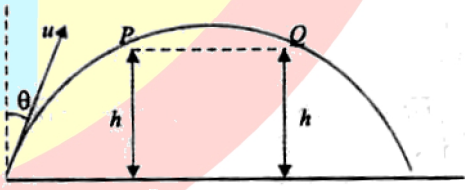
22. A particle is thrown with velocity u making an angle θ with the vertical. It just crosses the top of two poles each of height h after 1 s and 3 s respectively. The maximum height of projectile is

(a) 9.8 m

(b) 19.6 m

(c) 39.2 m

(d) 4.9 m



23. A particle is projected from a horizontal plane with a velocity of $8\sqrt{2}$ ms^{-1} at an angle. At highest point its velocity is found to be 8 ms^{-1}. Its range will be ($g = 10$ ms^{-2})

(a) 3.2 m (b) 4.6 m (c) 6.4 m (d) 12.8 m

24. A projectile is thrown in the upward direction making an angle of 60° with the horizontal direction with a velocity of 147 ms^{-1}. Then the time after which its inclination with the horizontal is 45°, is

(a) 15 s (b) 10.98 s (c) 5.49 s (d) 2.745 s

25. If H and R are the maximum height attained by a projectile and the horizontal range respectively, then the angle of projection at the origin is

(a) $\tan^{-1}\left(\frac{2H}{R}\right)$ (b) $\tan^{-1}\left(\frac{4H}{R}\right)$ (c) $\tan^{-1}\left(\frac{H}{R}\right)$ (d) $\tan^{-1}\left(\frac{3H}{2R}\right)$

26. A projectile can have the same range 'R' for two angles of projection. If 't_1' and 't_2' be the limes of flights in the two cases, then the product of the two time of flights is proportional to

(a) R (b) $\frac{1}{R}$ (c) $\frac{1}{R^2}$ (d) R^2

27. If a particle is thrown vertically upwards then its velocity so that it covers same distance in 5th and 6th seconds would be

(a) 48 m/s (b) 14 m/s (c) 49 m/s (d) 7 m/s

28. A stone is thrown vertically upward with an initial velocity u from the top of a tower, reaches the ground with a velocity 3 u. The height of the tower is

(a) $\frac{3u^2}{g}$ (b) $\frac{4u^2}{g}$ (c) $\frac{6u^2}{g}$ (d) $\frac{9u^2}{g}$

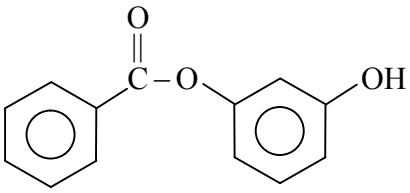
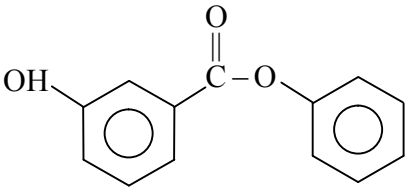
29. A balloon is rising vertically up with a velocity of 29 ms^{-1}. A stone is dropped from it and it reaches ground in 10 seconds. The height of the balloon when the stone was dropped from it is ($g = 9.8\ ms^{-2}$).

(a) 400 m (b) 150 m (c) 100 m (d) 200 m

30. A particle is released from rest from a tower of height 3 h. The ratio of the intervals of time to cover three equal heights h is

(a) $t_1 : t_2 : t_3 = 3 : 2 : 1$ (b) $t_1 : t_2 : t_3 = 1 : \left(\sqrt{2}-1\right) : \left(\sqrt{3}-2\right)$

(c) $t_1 : t_2 : t_3 = 1 : \sqrt{2} : \sqrt{3}$ (d) $t_1 : t_2 : t_3 = 1 : \left(\sqrt{2}-1\right) : \left(\sqrt{3}-\sqrt{2}\right)$

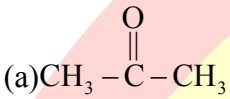
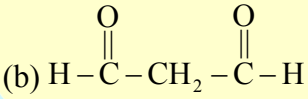
31.  and  express which type of isomers

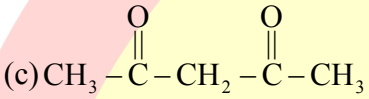
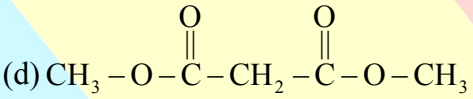
(a) Metamers (b) Tautomers (c) Functional isomers (d) Chain isomers

32. The molecules which not exhibit metamerism are

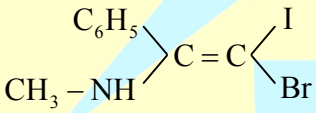
(a) $C_4H_{10}O$(ethers) (b) C_4H_8(Alkene) (c) $C_5H_{10}O$(ketone) (d) $C_4H_{11}N$(Amine)

33. Which molecule has higher enol contents

(a)  (b) 

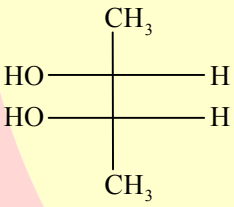
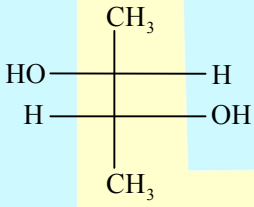
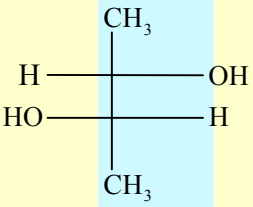
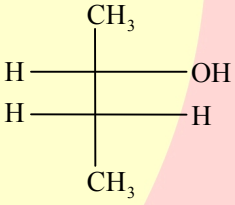
(c)  (d) 

34. Give the E-Z designation of the following compound –

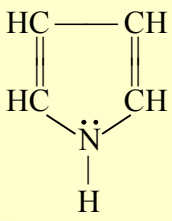


(a) Z (b) E (c) E-Z (d) E-E

35. A Fischer projection of (2R, 3S) -2,3-butanediol is

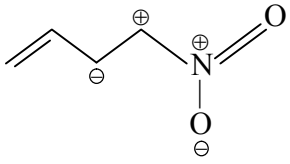
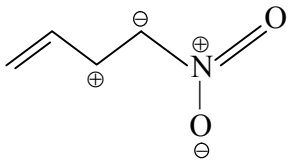
(a)  (b)  (c)  (d) 

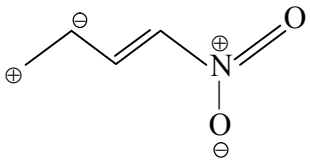
36. How many delocalised π- electrons are there in the compound



(a) 8 (b) 2 (c) 4 (d) 6

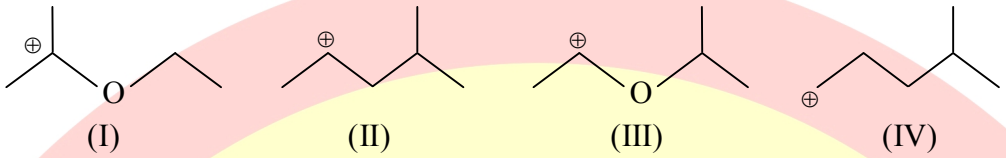
37. Among the following, the least stable resonance structure is

(a)  (b) 

(c) 

(d) None of these

38. The correct stability order for the following species is



(I) (II) (III) (IV)

(a) (II) > (IV) > (I) > (III)

(b) (I) > (II) > (III) > (IV)

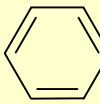
(c) (II) > (I) > (IV) > (III)

(d) (I) > (III) > (II) > (IV)

39. Which comparison is not correct as indicated?

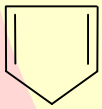
(a)  $-OH > CH_3OH$ (acidic nature)

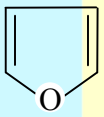
(b)  $-NH_2 > CH_3NH_2$ (basic nature)

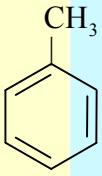
(c)  $-\overset{\oplus}{C}H_2 > CH_3\overset{\oplus}{C}H_2$ (stability)

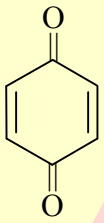
(d)  $-\overset{O}{\overset{\|}{C}}OH > CH_3\overset{O}{\overset{\|}{C}}OH$ (acidic nature)

40. Which is maximum acidic?

(a) 

(b) 

(c) 

(d) 

41. The observed dipole moment of HCl molecule is 1.03 D. If H–Cl bond distance is 1.275 Å and electronic charge is 4.8×10^{-10} e.s.u. The % polarity in HCl will be

(a) 1.275×1.03 %

(b) $\frac{4.8\times1.275\times10^{-8}}{1.03}$ %

(c) $\frac{1.03\times100}{4.8\times1.275}$ %

(d) $\frac{4.8\times10^{-10}}{1.03}\times 100\%$

42. Which of the following has same bond order as NO^+ has?

(a) CN^- (b) O_2^- (c) CN^+ (d) none of them

43. Among KO_2, AlO_2^-, BaO_2 and NO_2^+, unpaired electron is present in

(a) NO_2^+, BaO_2 (b) KO_2 and AlO_2^- (c) KO_2 only (d) BaO_2 only

44. Which of the following is planar?

(a) XeO_4 (b) XeO_2F_2 (c) XeO_3F_2 (d) XeF_4

45. Which of the following does not contain coordinate bond?

(a) BH_4^- (b) NH_4^+ (c) CO_3^{2-} (d) H_3O^+

46. The correct order in which the O–O bond length increases in the following is

(a) $O_2 < O_3 < H_2O_2$ (b) $H_2O_2 < O_3 < O_2$ (c) $O_3 < O_2 < H_2O_2$ (d) $O_2 < H_2O_2 < O_3$

47. Which species has the maximum number of lone pair of electrons on the central atom?

(a) ClO_3^- (b) XeF_4 (c) SF_4 (d) I_3^-

48. Molecular orbital electronic configuration for X_2^{n-} anion is

$KK^*(\sigma 2s)^2(\overset{*}{\sigma} 2s)^2(\pi 2p_x)^2(\pi 2p_y)^2(\sigma 2p_z)^2(\overset{*}{\pi} 2p_x)^1$

The anion X_2^{n-} is

(a) N_2^- (b) O_2^- (c) N_2^{2-} (d) O_2^{2-}

49. Among the following compounds, the one that is polar and has the central atom with sp^2 hybridization is

(a) H_2CO_3 (b) SiF_4 (c) BF_3 (d) $HClO_2$

50. Which among the following species is most stable?

(a) He_2 (b) He_2^+ (c) He_2^{2+} (d) H_2

51. Number of moles $KMnO_4$ that is needed to react with one mole of FeC_2O_4 in acidic medium is

(a) 2/5 (b) 3/5 (c) 4/5 (d) 1

52. 3 mol of a mixture of $FeSO_4$ and $Fe_2(SO_4)_3$ required 100 ml of 2 M $KMnO_4$ solution in acidic medium. Hence the mole fraction of $FeSO_4$ in the mixture is

(a) 1/3 (b) 2/3 (c) 2/5 (d) 3/5

53. How many ml of aqueous solution of $KMnO_4$ containing 158 g litre^{-1} must be used for complete conversion of 83 g of KI to I_2 in the presence of H_2SO_4?

(a) 90.36 ml (b) 100 ml (c) 85.09 ml (d) 65.05 ml

54. The anion nitrate can be converted into ammonium ion. The equivalent weight of NO_3^- ion in this reaction would be

(a) 6.20 (b) 7.75 (c) 10.5 (d) 21.0

55. For the reaction,

$M^{x+} + MnO_4^- \longrightarrow MO_3^- + Mn^{+2} + \frac{1}{2}O_2$ if one mole of MnO_4^- oxidizes 1.67 moles of M^{+x} to MO_3^-, then the value of x in the metal ion is

(a) 5 (b) 3 (c) 2 (d) 1

56. A 6.90 M solution of KOH in water has 30% of KOH by weight. The density of solution is

(a) 3.88 g/ml (b) 13.88 g/ml (c) 1.4 g/ml (d) 1.288 g/ml

57. 28 g N_2 and 6 g H_2 were mixed. At equilibrium 17 g NH_3 was formed. The weight of N_2 and H_2 at equilibrium are respectively.

(a) 11 g, 0 g (b) 1 g, 3 g (c) 11 g, 3 g (d) 14 g, 3 g

58. 8.7 gm of pure MnO_2 is heated with an excess of HCl and the gas evolved is passed into a solution of KI. The amount of I_2 liberated is

(a) 0.2 mole (b) 25.4 gm (c) 15.4 gm (d) 7.7 gm

59. A one litre solution of 0.1 M of a metal chloride MCl_x requires 500 mL of 0.6 M $AgNO_3$ solution for complete precipitation. The value of x is

(a) 1 (b) 2 (c) 4 (d) 3

60. Hydrochloric acid solutions A and B have concentrations 0.5 N and 0.1 N respectively. The volumes of solution A and solution B required to make a 2 litre solution of 0.2 N HCl are

(a) 0.5 L of A and 1.5 L of B (b) 1.5 L of A and 0.5 L of B

(c) 1.0 L of A and 1.0 L of B (d) 0.75 L of A and 1.25 L of B

61. If $f(x)=4x^3+3x^2+3x+4$, then $x^3 f\left(\frac{1}{x}\right)$ is

(a) $f(-x)$ (b) $\frac{1}{f(x)}$ (c) $\left[f\left(\frac{1}{x}\right)\right]^2$ (d) $f(x)$

62. The domain of $f(x)=\sqrt{\log\frac{1}{|\sin x|}}$ is

(a) $R-\{2n\pi,\ n\in I\}$ (b) $R-\{n\pi,\ n\in I\}$ (c) $R-\{-\pi,\ \pi\}$ (d) $(-\infty,\ \infty)$

63. The domain of $f(x)=\frac{\sqrt{-\log_{0.3}(x-1)}}{\sqrt{x^2+2x+8}}$ is

(a) $(1,\ 4)$ (b) $(-2,\ 4)$ (c) $(2,\ 4)$ (d) $[2,\ \infty)$

64. Let $f:(-1,\ 1)\to IR$ be such that $f(\cos 4\theta)=\frac{2}{2-\sec^2\theta}$ for $\theta\in\left(0,\ \frac{\pi}{4}\right)\cup\left(\frac{\pi}{4},\ \frac{\pi}{2}\right)$, then the value(s) of $f\left(\frac{1}{3}\right)$ is (are)

(a) $2+\sqrt{\frac{3}{2}}$ (b) $1+\sqrt{\frac{3}{2}}$ (c) $1-\sqrt{\frac{2}{3}}$ (d) $1+\sqrt{\frac{2}{3}}$

65. The range of $f(x)=\frac{x^2+x+2}{x^2+x+1}$, $x\in R$ is

(a) $(1,\ \infty)$ (b) $\left(1,\ \frac{11}{7}\right)$ (c) $\left(1,\ \frac{7}{3}\right]$ (d) $\left(1,\ \frac{7}{5}\right]$

66. The range of $f(x)=4^x+2^x+1$ is

(a) $(0,\ \infty)$ (b) $(1,\ \infty)$ (c) $(2,\ \infty)$ (d) $(3,\ \infty)$

67. If $f(x)=\frac{x}{\sqrt{1+x^2}}$, then $(fofof)(x)$ is equal to

(a) $\frac{3x}{\sqrt{1+x^2}}$ (b) $\frac{x}{\sqrt{1+3x^2}}$ (c) $\frac{3x}{1-x^2}$ (d) None of these

68. The range of function $f(x)=x^2+\frac{1}{x^2+1}$ is

(a) $[1,\ \infty)$ (b) $[2,\ \infty)$ (c) $\left[\frac{3}{2},\ \infty\right)$ (d) None of these

69. The domain of $f(x)=\frac{1}{\sqrt{[x]^2-[x]-6}}$ is

(a) $(-\infty,\ -2)\cup[4,\ \infty)$ (b) $(-\infty,\ -2]\cup[4,\ \infty)$ (c) $(-\infty,\ -2)\cup(4,\ \infty)$ (d) None of these

70. Let the function $f : R \to R$ be defined by $f(x) = 2x + \sin x$. Then, f is

(a) one-one and onto (b) one-one and into (c) many-one and onto (d) many-one and into

71. The function $f : (-\infty, -1] \to (0, e^5]$ defined by $f(x) = e^{x^3 - 3x + 2}$ is

(a) one-one and onto (b) one-one and into (c) many one and into (d) many one and onto

72. If $f : R \to R$ satisfies $f(x+y) = f(x) + f(y)$, for all $x, y \in R$ and $f(1) = 7$, then $\sum_{r=1}^{n} f(r)$ is

(a) $\frac{7n}{2}$ (b) $\frac{7(n+1)}{2}$ (c) $7n(n+1)$ (d) $\frac{7n(n+1)}{2}$

73. If $y = f(x)$ satisfy the condition $f\left(x + \frac{1}{x}\right) = x^2 + \frac{1}{x^2} (x \neq 0)$, then $f(x)$ is

(a) $-x^2 + 2$ (b) $-x^2 - 2$ (c) $x^2 - 2,\ x \in R - \{0\}$ (d) $x^2 - 2,\ |x| \in [2, \infty)$

74. The domain of $f(x) = \sqrt{x - x^2} + \sqrt{4 + x} + \sqrt{4 - x}$ is

(a) $[-4, \infty)$ (b) $[-4, 4]$ (c) $[0, 4]$ (d) $[0, 1]$

75. The range of $f(x) = \log_e \sqrt{4 - x^2}$ is

(a) $(0, \infty)$ (b) $(-\infty, \infty)$ (c) $(-\infty, \log_e 2]$ (d) $(\log_e 2, \infty)$

76. Let $f(x) = \frac{x^2 - 4}{x^2 + 4}$ for $|x| > 2$, then the function $f : (-\infty, -2] \cup [2, \infty) \to (-1, 1)$ is

(a) one-one into (b) one-one onto (c) many-one into (d) many-one onto

77. If $x = 111...1$ (20 digits), $y = 333...3$ (10 digits) and $z = 222...2$ (10 digits), then $\frac{x - y^2}{z}$ equals

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 4

78. If a, b, c are non-zero real numbers, then the minimum value of the expression

$\frac{(a^8 + 4a^4 + 1)(b^4 + 3b^2 + 1)(c^2 + 2c + 2)}{a^4 b^2}$ equals

(a) 12 (b) 24 (c) 30 (d) 60

79. If the sum of m consecutive odd integers is m^4, then the first integer is

(a) $m^3 + m + 1$ (b) $m^3 + m - 1$ (c) $m^3 - m - 1$ (d) $m^3 - m + 1$

80. If 2λ, λ and $[\lambda^2 - 14]$, $\lambda \in R - \{0\}$ and $[\cdot]$ denotes the greatest integer function are the first three terms of a GP in order, then the 51th term of the sequence, 1, 3λ, 6λ, 10λ, ... is

(a) 5104 (b) 5304 (c) 5504 (d) 5704

81. Let $a_1, a_2, ..., a_{10}$ be in AP and $h_1, h_2, ..., h_{10}$ be in HP. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ is

(a) 2 (b) 3 (c) 5 (d) 6

82. If $a(b-c)x^2 + b(c-a)xy + c(a-b)y^2$ is a perfect square, the quantities a, b, c are in

(a) AP (b) GP (c) HP (d) None of these

83. If 11 AM's are inserted between 28 and 10, the number of integral AM's is

(a) 5 (b) 6 (c) 7 (d) 8

84. The minimum value of the quantity $\frac{(a^2+3a+1)(b^2+3b+1)(c^2+3c+1)}{abc}$, where $a, b, c \in R^+$, is

(a) $\frac{11^3}{2^3}$ (b) 125 (c) 25 (d) 27

85. If a, b, c are in AP and $|a|, |b|, |c| < 1$ and

$$x = 1 + a + a^2 + ... + \infty$$
$$y = 1 + b + b^2 + ... + \infty$$
$$z = 1 + c + c^2 + ... + \infty$$

Then, x, y, z will be in

(a) AP (b) GP (c) HP (d) None of these

86. Let $a_1, a_2, a_3, ...$ be terms are in AP, if $\frac{a_1 + a_2 + ... + a_p}{a_1 + a_2 + ... + a_q} = \frac{p^2}{q^2}$, $p \neq q$, then $\frac{a_6}{a_{21}}$ equals

(a) $\frac{41}{11}$ (b) $\frac{7}{2}$ (c) $\frac{2}{7}$ (d) $\frac{11}{41}$

87. If 100 times the 100th term of an AP with non-zero common difference equals the 50 times its 50th term, then the 150th term of this AP is

(a) 150 times its 50th term (b) 150

(c) zero (d) –150

88. For any three positive real numbers a, b and c, $9(25a^2 + b^2) + 25(c^2 - 3ac) = 15b(3a + c)$. Then

(a) a, b and c are in GP (b) b, c and a are in GP

(c) b, c and a are in AP (d) a, b and c are in AP

89. $\sum_{r=1}^{10} \frac{r}{1 - 3r^2 + r^4} =$

(a) $-\frac{50}{109}$ (b) $-\frac{54}{109}$ (c) $-\frac{55}{111}$ (d) $-\frac{55}{109}$

90. The sum of the series $1 + \frac{4}{5} + \frac{7}{5^2} + \frac{10}{5^3} + ...$ to infinite terms, is :

(a) $\frac{31}{12}$ (b) $\frac{41}{16}$ (c) $\frac{45}{16}$ (d) $\frac{35}{16}$

ANSWER KEY

PHYSICS									
1	2	3	4	5	6	7	8	9	10
B	**A**	**A**	**C**	**B**	**C**	**D**	**A**	**A**	**A**
11	12	13	14	15	16	17	18	19	20
A	**A**	**C**	**D**	**A**	**C**	**B**	**C**	**B**	**C**
21	22	23	24	25	26	27	28	29	30
B	**B**	**D**	**C**	**B**	**A**	**C**	**B**	**D**	**D**
CHEMISTRY									
31	32	33	34	35	36	37	38	39	40
A	**B**	**B**	**B**	**A**	**D**	**A**	**D**	**B**	**A**
41	42	43	44	45	46	47	48	49	50
C	**A**	**C**	**D**	**C**	**A**	**D**	**A**	**A**	**D**
51	52	53	54	55	56	57	58	59	60
B	**A**	**B**	**B**	**C**	**D**	**D**	**B**	**D**	**A**
MATHS									
61	62	63	64	65	66	67	68	69	70
D	**B**	**D**	**B**	**C**	**B**	**B**	**A**	**A**	**A**
71	72	73	74	75	76	77	78	79	80
B	**D**	**D**	**D**	**C**	**C**	**B**	**C**	**D**	**B**
81	82	83	84	85	86	87	88	89	90
D	**C**	**A**	**B**	**C**	**D**	**C**	**C**	**D**	**D**