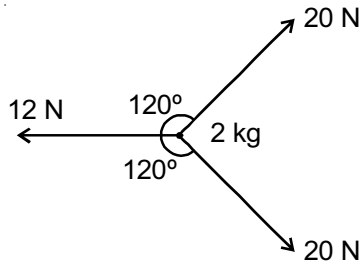


5. In a YDSE set up each slit produces wave of intensity I_0 if intensity of one of the slit becomes double then the ratio of I_{\max} to I_{\min} will become
- (1) $\frac{2}{1}$ (2) $(4 + 2\sqrt{2})$
- (3) $\frac{(3 + 2\sqrt{2})^2}{(\sqrt{2} - 1)^2}$ (4) $(17 + 12\sqrt{2})$
6. In an intrinsic semiconductor. The ratio of electronic and hole current is 2 : 3. What is the ratio of their drift velocities?
- (1) $\frac{2}{3}$
- (2) $\frac{3}{2}$
- (3) 1
- (4) 4 : 9
7. In a full wave rectifier. If frequency of input A.C. source is f , their frequency of output D.C. will be
- (1) f
- (2) $2f$
- (3) $\frac{f}{2}$
- (4) Zero
8. In a YDSE set up, if monochromatic beam is used in slits then shape of interference pattern formed on front screen is
- (1) Straight line
- (2) Parabola
- (3) Circle
- (4) Hyperbola
9. A particle moves in a straight line following position x and with time t related as $t \propto x^3$, then its retardation is proportional to
- (1) x
- (2) $\frac{1}{x^3}$
- (3) $\frac{1}{x^5}$
- (4) It is constant
10. A man of mass 60 kg resting on rough horizontal surface, holds a machine gun of mass 20 kg fires bullet of mass 40 g with velocity 1200 m/s. horizontally. If he fires three bullets per second and about to slip on the surface. What is the friction coefficient between his shoes and surface?
- (1) 0.18
- (2) 0.24
- (3) 0.60
- (4) 0.80
11. Three coplanar forces of magnitude 20 N, 20 N and 12 N are acting on a particle of mass 2 kg as shown. The acceleration of this particle is
- 
- (1) 2 m/s^2
- (2) 4 m/s^2
- (3) 14 m/s^2
- (4) Zero
12. A particle (m) is projected in oblique projectile of mass m and speed u at angle θ . Its angular momentum as a function of time about point of projection is given by
- (1) $mg(u \cos \theta - u \sin \theta)t^2$
- (2) $\frac{1}{2}mg u (\cos \theta + \sin \theta)t^2$
- (3) $\frac{1}{2}mg u \cos \theta t^2$
- (4) $\frac{1}{2}mg u \sin \theta t^2$
13. A particle of mass 1 kg is moving in a circular path of radius 6 m. Its speed as function of time is given as $v = 2t$. The power of this particle at $t = 1 \text{ s}$.
- (1) 2 watt
- (2) 4 watt
- (3) 8 watt
- (4) Zero

14. A particle of mass 2 kg is displaced from (0, 0) to (2, 3) in a uniform gravitational field $\vec{T} = (\hat{i} + \hat{j})$. The work done by this conservative force is

- (1) $\sqrt{26}$ J
- (2) 10 J
- (3) 5 J
- (4) Zero

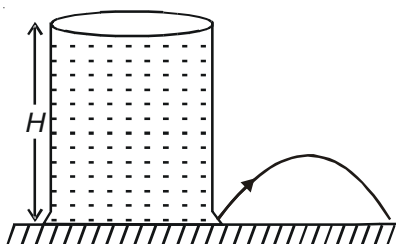
15. If the length of the day is T , the height of that TV satellite above the earth's surface which always appears stationary from earth, will be :-

- (1) $h = \left[\frac{4\pi^2 GM}{T^2} \right]^{1/3}$
- (2) $h = \left[\frac{4\pi^2 GM}{T^2} \right]^{1/2} - R$
- (3) $h = \left[\frac{GMT^2}{4\pi^2} \right]^{1/2} - R$
- (4) $h = \left[\frac{GMT^2}{4\pi^2} \right]^{1/3} + R$

16. A spring of force constant k is cut into two parts of length ratio 1 : 2 and these parts are joined in parallel, then force constant of this combination will become

- (1) k
- (2) $\frac{9k}{2}$
- (3) $\frac{9k}{4}$
- (4) $\frac{k}{2}$

17. A hole is made at side wall near bottom of a beaker filled with water upto height H , the beaker near to bottom is slanted. The maximum range of water jet falling on surface as shown



- (1) H
- (2) $2H$
- (3) $\frac{H}{2}$
- (4) Zero

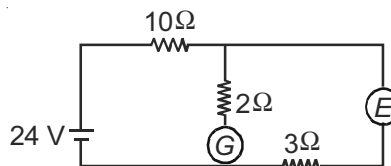
18. The bob of a simple pendulum executing SHM in air with time period T and in water with time period $2T$. If viscosity of water is neglected, what is the relative density of bob?

- (1) 2
- (2) 4
- (3) $\frac{4}{3}$
- (4) $\frac{5}{4}$

19. A transverse wave in a string is described as $y = A \sin(ax^2 + t^2 - 2\sqrt{a}xt)$. The speed of the wave is

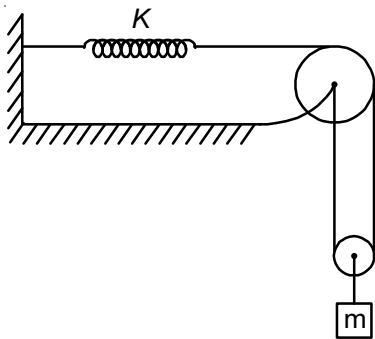
- (1) \sqrt{a}
- (2) 1
- (3) $\frac{1}{\sqrt{a}}$
- (4) $\frac{1}{a^2}$

20. In the circuit given below, the galvanometer G shows zero deflection. The value of unknown battery is

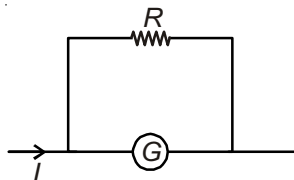


- (1) 2.4 V
- (2) 24 V
- (3) 7.2 V
- (4) 1.2 V

21. A body of mass 3.0 kg is moving along the x-axis with a speed of 5.00 m/s. The KE of this body will be reported as
- (1) 37.5 J
 - (2) 37 J
 - (3) 38 J
 - (4) 39.5 J
22. A block of mass m is released from rest in situation as shown in figure, initially the spring is in natural length. What is the maximum elongation of spring?



- (1) $\frac{mg}{K}$
 - (2) $\frac{2mg}{K}$
 - (3) $\frac{4mg}{K}$
 - (4) $\frac{mg}{2K}$
23. What is the value of resistance R for which 20% of main current passes through the galvanometer of resistance 80Ω ?



- (1) 10Ω
- (2) 20Ω
- (3) 30Ω
- (4) 40Ω

24. If x_1 be the size of magnified image and x_2 the size of diminished image in lens displacement method, then size of the object is given by

- (1) $\sqrt{x_1 x_2}$
- (2) $\frac{x_1 + x_2}{2}$
- (3) $\frac{2x_1 x_2}{x_1 + x_2}$
- (4) $\sqrt{x_1^2 + x_2^2}$

25. The energy released by the fission of one uranium atom is 20 MeV. The number of such fission per second required to produce power 3.2 W, taking efficiency 10%

- (1) 10^7
- (2) 10^{10}
- (3) 10^{15}
- (4) 10^{13}

26. A ball is projected vertically up with a speed of 80 m/s. It will be at a point 20 m below the highest point exactly after a time interval of ($g = 10 \text{ m/s}^2$)

- (1) 8 s
- (2) 6 s
- (3) 5 s
- (4) 7 s

27. The power delivered by a force to a particle depends on the speed of particle as $P(\text{watt}) = 3v - v^2$, where v is speed in m/s. The force acting on the particle at the instant, when the power delivered by the force is maximum, is

- (1) 3 N
- (2) 1.5 N
- (3) 6 N
- (4) Zero

28. A disc of moment of inertia I about its axis is melt and recast into a ring whose radius is double that of the disc. The moment of inertia of the ring about its axis will be

- (1) $2I$
 (2) $4I$
 (3) $8I$
 (4) $\frac{I}{2}$

29. A body of mass m is moved from the surface of earth to a height equal to $3R$ above surface of earth. If R be the radius of earth and g be the acceleration due to gravity at the surface of earth, the increase in gravitational potential energy of the body is

- (1) $3mgR$
 (2) $2mgR$

(3) $\frac{3mgR}{4}$

(4) $\frac{mgR}{4}$

30. The breaking stress of a material is B . The maximum length of a wire made of the material, which can hang without breaking under its own weight is (given ρ is density of material, g is acceleration due to gravity)

(1) $\frac{B}{\rho g}$

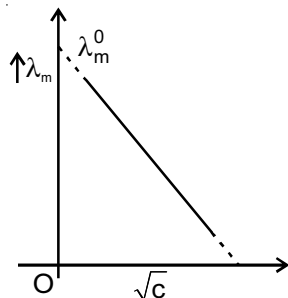
(2) $\frac{\rho g}{B}$

(3) $\frac{B}{2\rho g}$

(4) $\frac{2B}{\rho g}$

[CHEMISTRY]

31. Following graph is not valid for



- (1) NaCl (aq)
 (2) $\text{K}_2\text{SO}_4 \text{ (aq)}$
 (3) PhCOOH (aq)
 (4) $\text{CaCl}_2 \text{ (aq)}$

32. Ionic mobility of Ba^{+2} aqueous solution, if its molar conductivity is x , will be

- (1) $\frac{x}{193000}$
 (2) $\frac{x}{48250}$
 (3) $96500x$
 (4) $48250x$

33. In 2D close hexagonal packing of spheres, % packing fraction of the lattice is

- (1) 68%
 (2) 74%
 (3) 78%
 (4) 90%

34. Tensile strength is maximum in

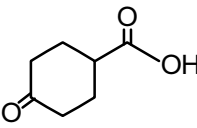
- (1) Nylon-6
 (2) Bakelite
 (3) Vulcanised rubber
 (4) Silicone of RSiCl_3

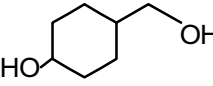
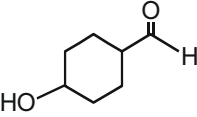
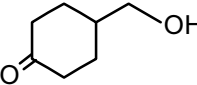
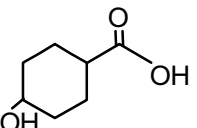
35. On reaction with $\text{Br}_2/\text{H}_2\text{O}$, trans-2-butene produces some optically active compounds. Total number of optically active compounds will be

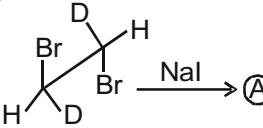
- (1) 1
 (2) 2
 (3) 3
 (4) 4

36. Reaction of anhydrous HI with $\text{Me}_3\text{C}-\text{O}-\text{CH}_3$ mainly produces

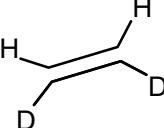
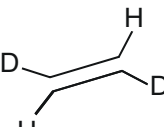
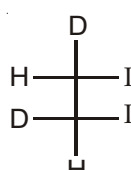
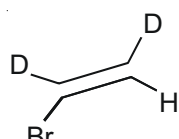
- (1) $\text{Me}_3\text{COH} + \text{CH}_3\text{I}$
- (2) $\text{Me}_3\text{C}-\text{I} + \text{CH}_3-\text{OH}$
- (3) $\text{Me}_2\text{C}=\text{CH}_2 + \text{CH}_3\text{OH}$
- (4) $\text{Me}_3\text{COH} + \text{Me}-\text{OH}$

37. Reduction of  with $\text{NaBH}_4/\text{alcohol}$ gives

- (1) 
- (2) 
- (3) 
- (4) 

38.  $\xrightarrow{\text{NaI}}$ (A)

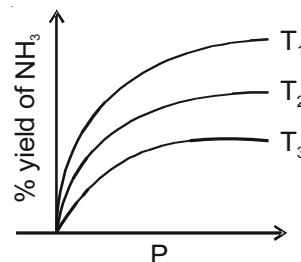
Main product (A) is

- (1) 
- (2) 
- (3) 
- (4) 

39. pH of saturated solution of $\text{M}(\text{OH})_2$ having $K_{\text{SP}} = 5 \times 10^{-16}$ at 25°C is

- (1) 5
- (2) 8
- (3) 7
- (4) 9

40. Preparation of $\text{NH}_3(\text{g})$ by the reaction $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3(\text{g})$ shows the following graph in % yield against pressure at different temperature then



- (1) $T_2 > T_1 > T_3$
- (2) $T_1 > T_2 > T_3$
- (3) $T_3 > T_2 > T_1$
- (4) $T_1 = T_2 = T_3$

41. $\text{Fe}(\text{OH})_3(\text{s}) \xrightarrow{\text{HCl}}$ (A) $\xrightarrow{\text{K}_3[\text{Fe}(\text{CN})_6]}$ (B)

colour of (B) is

- (1) Prussian blue
- (2) Turnbull's blue
- (3) Brown
- (4) Pink

42. In a double strand DNA, percentage of adenine (A) in bases is 22% then % of guanine (G) is

- (1) 11%
- (2) 44%
- (3) 56%
- (4) 28%

43. Solution of which of the following species more basic?

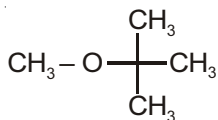
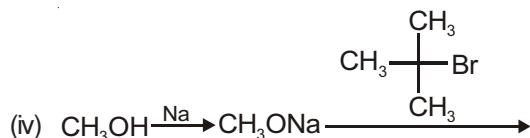
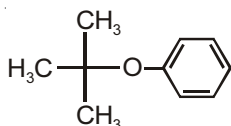
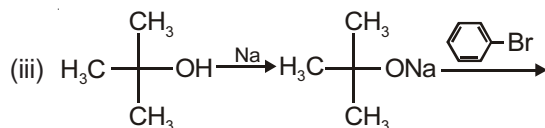
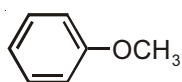
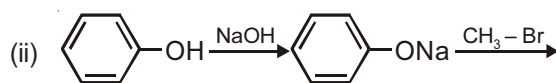
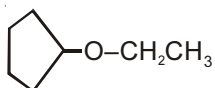
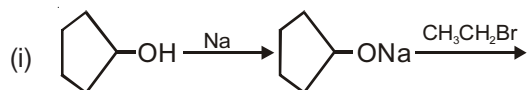
- (1) Sodium dihydrogen phosphate
- (2) Sodium phosphinate
- (3) Sodium oxalate
- (4) Sodium metaborate

44. In $K_2Cr_2O_7$
- (1) All Cr – O bonds have same bond length
 - (2) Bridge Cr – O bond has bond order equal to $\frac{5}{3}$
 - (3) Hybridisation of Cr is dsp^2
 - (4) Two tetrahedron CrO_4 units having one common oxygen are found
45. In an exothermic reaction $A \rightarrow B$, the E_a of reaction is 120 kJ/mole of A. The enthalpy of reaction is –140 kJ/mole. The activation energy of the reaction $B \rightarrow A$ is
- (1) 20 kJ/mole
 - (2) 260 kJ/mole
 - (3) 360 kJ/mole
 - (4) 120 kJ/mole
46. Which of the following reaction is accompanied with emission of proton?
- (1) ${}^{10}_5B + {}^4_2He \rightarrow {}^{13}_7N$
 - (2) ${}^{14}_7N + {}^4_2He \rightarrow {}^{17}_8O$
 - (3) ${}^{241}_{95}Am + {}^4_2He \rightarrow {}^{244}_{97}Bk$
 - (4) ${}^2_1H + {}^3_1H \rightarrow {}^4_2He$
47. Number of waves in a Bohr's orbit of H atom is 2. Its potential energy would be
- (1) –10.2 eV
 - (2) –6.8 eV
 - (3) –3.02 eV
 - (4) –1.51 eV
48. Which of the following is incorrect in Castner Kellner process?
- (1) Hg acts as cathode as well as anode
 - (2) Cl_2 gas evolves at anode
 - (3) Ratio of n_{H_2} and n_{Cl_2} in the process is 2 : 1
 - (4) Caustic soda is made in middle compartment of the cell
49. Ionic hydride among following is
- (1) BeH_2
 - (2) MgH_2
 - (3) EuH_2
 - (4) CuH_2
50. Which is not the ore of Fe?
- (1) Calamine
 - (2) Siderite
 - (3) Haematite
 - (4) Magnetite
51. IUPAC name of $Na_4[Fe(CN)_5NOS]$ is
- (1) Sodium pentacyanidothionitroferrate (II)
 - (2) Sodium pentacyanidosulphidonitrosyliumferrate (I)
 - (3) Sodium pentacyanidonitrosylsulphidoferrate (II)
 - (4) Sodium pentacyanidonitrosylsulphidoferrate (III)
52. Allyl may act as
- (1) σ – donor ligand
 - (2) π – donor ligand
 - (3) π – acceptor ligand
 - (4) All of these
53. Hydrolysis of XeF_4 produces Xe, XeO_3 , HF and O_2 molar ratio of Xe to XeO_3 will be
- (1) 2 : 3
 - (2) 3 : 2
 - (3) 1 : 2
 - (4) 2 : 1
54. Oxidation state of Cr in $[CrO_5(OEt)_2]$ is
- (1) +5
 - (2) +6
 - (3) +4
 - (4) +8
55. Correct order of bond strength
- (1) $3s - 3s > 3p\pi - 3p\pi > 3p\pi - 3d\pi$
 - (2) $3s - 3s > 3p\pi - 3d\pi > 3p\pi - 3p\pi$
 - (3) $3p\pi - 3p\pi > 3s - 3s > 3p\pi - 3d\pi$
 - (4) $2s - 2s > 2p - 3s > 2p - 2s$

56. In which solution formation, ΔS_{mixing} is positive?

- (1) Ideal solution
- (2) Non-ideal solution showing positive deviation
- (3) Non-ideal solution showing negative deviation
- (4) All of these

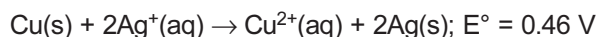
57. Consider the following synthetic reactions involving Williamson Ether Synthesis



Which of the above reactions constitute good synthesis?

- (1) (i), (ii) & (iv)
- (2) (ii) & (iii)
- (3) (iii) & (iv)
- (4) (i) & (ii)

58. Calculate the equilibrium constant of the reaction



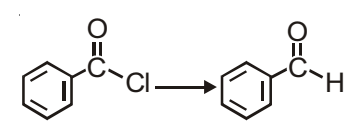
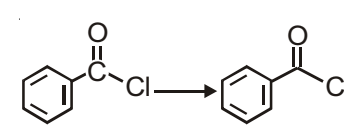
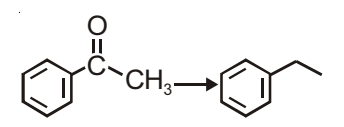
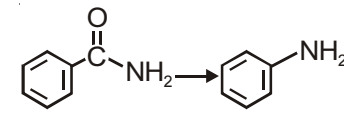
at 298 K

- (1) 3.92×10^{-15}
- (2) 3.92×10^{15}
- (3) 3.92×10^2
- (4) 3.92×10^{-5}

59. 2 g of $\text{C}_6\text{H}_5\text{COOH}$ dissolved in 25 g of benzene shows a depression in freezing point equal to 1.62 K. Molar depression constant for benzene is 4.9 kg/mol. What is the percentage association of acid if it forms dimer in solution?

- (1) 89.2%
- (2) 8.92%
- (3) 99.2%
- (4) 9.92%

60. Match column-I with column-II and select the correct answer using the codes given below the lists

Column-I	Column-II
a. 	(i) DIBAL-H
b. 	(ii) Li, CuI, CH_3I
c. 	(iii) $\text{N}_2\text{H}_4 / \bar{\text{O}}\text{H}$
d. 	(iv) LiAlH_4
	(v) $\text{NaOH} / \text{Br}_2$

- (1) a(i), b(ii), c(iii), d(iv)
- (2) a(ii), b(iii), c(i), d(iv)
- (3) a(i), b(ii), c(iii), d(v)
- (4) a(ii), b(i), c(iii), d(v)

[MATHEMATICS]

61. Number of solutions of the equation

$$x - \frac{1}{x-1} = 1 + \frac{1}{(x-1)}$$
 are

- (1) 1
(2) 0
(3) 2
(4) 3

62. $x^2(a+b) + x(2a-3b+1) + a-2b+1 = 0$, find values of a & b such that equation becomes identity

- (1) $a = -\frac{1}{5}, b = \frac{1}{5}$
(2) $a = 1, b = +1$
(3) No solution
(4) $a = 0, b = 0$

63. Number of solutions of equation,

$$25^{\frac{x}{2}} + 25^{-\frac{x}{2}} = \frac{2}{\log_5 2 + 1}$$
 are

- (1) 1
(2) 0
(3) 2
(4) Infinite

64. A student is allowed to select ' n ' books from collection of $(2n+1)$ books. If total number of ways in which he can select books is 255, then value of n is

- (1) 3
(2) 2
(3) 4
(4) 5

65. $\frac{(1+x-x^2)^2}{1+x^2} = a_0 + a_1x + a_2x^2 + \dots + a_nx^n$, then the value of $a_0 + a_2 + a_4 \dots$ is

- (1) $\frac{1}{2}$
(2) $\frac{3}{2}$

(3) 0

(4) $\frac{4}{3}$

66. $f(1) = 2, g(1) = 2, f'(x), g'(x)$ exist then, value of

$$\lim_{x \rightarrow 1} \frac{f(1)g(x) - f(x)g(1)}{f(1)g(x) - f(x)g(1)}$$
 is

- (1) 4
(2) 3
(3) 1
(4) 0

67. $\cos^2x(\cos^6x - 1) = 1 - \sin^4x$, then real solutions of x is

- (1) $(2n+1)\frac{\pi}{2}$
(2) $n\pi$
(3) $(2n+1)\frac{\pi}{4}$
(4) $2n\pi$

68. $x^y = e^{e^{2x-5\ln y}}$, then $\left(\frac{dy}{dx}\right)_{x=e}$ is

- (1) $e^{\frac{e}{3}}\left(2 - \frac{1}{e}\right)$
(2) $e^{\frac{e}{3}}\left(\frac{1}{3} - \frac{1}{6e}\right)$
(3) $e^{\frac{e}{3}}$
(4) $\left(2 - \frac{1}{e}\right)e^e$

69. The distance of the point $(4, 0)$ from the curve $2x^2 + y^2 - 8x = 0$ is equal to

- (1) 1
(2) Zero
(3) 2
(4) 6

70. $\lim_{x \rightarrow a} \left(2 - \frac{a}{x} \right)^{\tan\left(\frac{\pi x}{2a}\right)}$ is equal to

- (1) $e^{-\frac{a}{\pi}}$
- (2) $e^{-\frac{2a}{\pi}}$
- (3) $e^{-\frac{2}{\pi}}$
- (4) 1

71. The coefficient of y in the determinant

$$\begin{vmatrix} (1+y)^{m_1 n_1} & (1+y)^{m_1 n_2} & (1+y)^{m_1 n_3} \\ (1+y)^{m_2 n_1} & (1+y)^{m_2 n_2} & (1+y)^{m_2 n_3} \\ (1+y)^{m_3 n_1} & (1+y)^{m_3 n_2} & (1+y)^{m_3 n_3} \end{vmatrix}$$
 is equal to k_1 ,

then $\{k\}$ is equal to (where $\{\cdot\}$ denotes fractional function)

- (1) 0
- (2) 0.2
- (3) 0.4
- (4) 0.5

72. The value of $\cot^{-1}\left(2^2 + \frac{1}{2}\right) + \cot^{-1}\left(2^3 + \frac{1}{2^2}\right) + \dots \infty$ is

equal to $\tan^{-1} \frac{k_1}{k_2}$, then, the value of $\frac{(k_1)^{2013}}{(k_2)^{10}}$ is equal

to (where k_1 and k_2 are relatively prime numbers)

- (1) $\frac{1}{1024}$
- (2) $\frac{1}{526}$
- (3) $\frac{1}{64}$
- (4) $\frac{1}{32}$

73. If $\begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix} = 0$, $a, b, c \neq 0$, then which of the following is correct?

- (1) $(a + b + c) = 0$
- (2) $a + b\omega + c\omega^2 = 0$
- (3) $a + b\omega^2 + c\omega = 0$
- (4) All of these

74. $f(x) = \frac{x}{1 + x \tan x}$ is maximum when,

- (1) $x = \cos x, 0 \leq x \leq \frac{\pi}{2}$
- (2) $x = \sin x, 0 \leq x \leq \frac{\pi}{2}$
- (3) $x = \cot x, -0 \leq x \leq \frac{\pi}{2}$
- (4) $x = \tan x, -0 \leq x \leq \frac{\pi}{2}$

75. $\lim_{x \rightarrow \pi} \frac{1 - \cos(7(x - \pi))}{(x - \pi)}$ is

- (1) 0
- (2) 1
- (3) -1
- (4) Does not exist

76. The number of points of intersection between the curves $y = \operatorname{cosec}^{-1} x$ and $y = x$ are

- (1) Zero
- (2) One
- (3) Two
- (4) Infinite

77. The number of common roots between the equations $Z^5 + Z^4 + Z^3 + Z^2 + Z + 1 = 0$

and $Z^{1000} + Z^{998} + 1 = 0$ are

- (1) Four
- (2) Zero
- (3) Two
- (4) One

78. Product of the common roots between the equation $Z^{20} = 1$ and $Z^{15} = 1$ is
- -1
 - 1
 - i
 - $-i$
79. If the roots of the equation $x^3 - 7x^2 + 14x - 8 = 0$ are α, β, γ , where $(\alpha < \beta < \gamma)$, then, the equation whose roots are $2\alpha, \beta^2, \frac{\sqrt{\gamma}}{2}$ is
- $x^3 - 3x^2 + 3x - 1 = 0$
 - $x^3 - 6x^2 + 11x - 6 = 0$
 - $x^3 - 7x^2 + 14x - 8 = 0$
 - $x^3 - 7x^2 + 16x - 12 = 0$
80. Let $f(x) = \log_a(x + \sqrt{x^2 + 1})$; $a > 1$ then, the inverse of $f(x)$ is positive on
- $(0, \infty)$
 - $(-\infty, \infty)$
 - $[0, a]$
 - $(-\infty, a]$
81. If the vectors $\vec{m} = r \log_2 x \hat{i} - 6\hat{j} + 3\hat{k}$ and $\vec{n} = \log_2 x \hat{i} + 2\hat{j} + 2r \log_2 x \hat{k}$ make an obtuse angle $\forall x \in (0, \infty)$, then r may belong to
- $(-\infty, 0)$
 - $\left(-\frac{4}{3}, \infty\right)$
 - $(-1, 0)$
 - $(-\infty, -5)$
82. Image of $(2, 3)$ about the line $y = x$ is
- $(3, 2)$
 - $(2, -3)$
 - $(-3, -2)$
 - $(-3, 2)$
83. A circle of radius r with both coordinates of its centre positive, touches the x -axis and line $3y - 4x = 0$, then, the equation of circle is
- $x^2 + y^2 + 4rx - 2ry + 4r^2 = 0$
 - $x^2 + y^2 - 4rx - ry + 4r^2 = 0$
 - $2x^2 + 2y^2 - 4rx - 2ry + 8r^2 = 0$
 - $2x^2 + 2y^2 - 8rx - 4ry + 8r^2 = 0$
84. Vectors $\vec{a}, \vec{b}, \vec{c}$ are such that every pair is non-collinear and the vector $\vec{a} + \vec{b}$ is collinear with \vec{c} and vector $(\vec{b} + \vec{c})$ is collinear with \vec{a} . The resultant of \vec{a}, \vec{b} and \vec{c} is
- $\vec{0}$
 - \vec{a}
 - $3\vec{c}$
 - $2\vec{a}$
85. If $f'(x) = (x - m)^{2k}(x - n)^{2k+1}, m < n$, then (where $k \in \mathbb{Z}^+$)
- $x = m$ is point of maxima
 - $x = n$ is point of maxima
 - $x = m$ is point of neither maxima nor minima
 - $x = n$ is point of neither maxima nor minima
86. Let $f: (-1, 1) \rightarrow \mathbb{R}$ be a differentiable function with $f(0) = 1$ and $f'(0) = -1$. If $g(x) = (f(nf(x) - n))^n$, where n is a natural number and $g'(0) = 4$, then n equals
- 1
 - 2
 - 3
 - 4
87. Let $f(x) = \frac{7x - 29}{29x - 7}$ and let D and S be the domain and range of $f(x)$ respectively. Then the number of elements in $D' \cap S'$ is
- 0
 - 1
 - 2
 - Infinitely many

88. The relation S on the set of natural numbers defined by

$$S = \{(m, n) : |m^2 - n^2| \text{ is a prime number}\} \text{ is}$$

- (1) Reflexive only
- (2) Symmetric only
- (3) Transitive only
- (4) An equivalence relation

89. If α, β are the roots of the equation $x^2 - x + 1 = 0$, then $\alpha^{2011} + \beta^{2011}$ equals

- (1) -2
- (2) -1

(3) 1

(4) 2

90. In a triangle ABC , if $\sin A, \sin B, \sin C$ are in AP, then

the maximum value of $\tan \frac{B}{2}$ is

(1) $\frac{1}{3}$

(2) $\sqrt{3}$

(3) $\frac{1}{\sqrt{3}}$

(4) 1





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ANSWERS

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