Topic: **Pre –ECET** **Max. Marks:**100

1. Solution of $\frac{d^2y}{dx^2}+(a+b)\frac{dy}{dx}+aby=0$ is

1) $y=c_1e^{-ax}+c_2e^{-bx}$ 2) $y=c_1e^{ax}+c_2e^{bx}$ 3) $y=c_1e^{ax}+c_2e^{-bx}$ 4) $y=c_1e^{a^2x}+c_2e^{2bx}$

2. Solution of $\frac{dy}{dx}+y\cot x=\operatorname{cosec} x$ is

1) $y=(x+c)\operatorname{cosec} x$ 2) $y=(x+c)\sec x$ 3) $y=(x+c)\sin x$ 4) $y=(x+c)\tan x$

3. Solution of $\frac{dy}{dx}=e^{3x-2y}+x^2e^{-2y}$ is 1) $3e^{2y}=2(x^3-e^{3x})+c$ 2) $3e^{2y}=2(x^{3x}-x^3)+c$

3) $2e^{2y}=3(e^{3x}+x^3)+c$ 4) $3e^{2y}=2(e^{3x}+x^3)+c$

4. Solution of $\frac{dy}{dx}=\sec(x+y)$ is

1) $y=\text{Cos}\left(\frac{x+y}{2}\right)+c$ 2) $y=\tan\left(\frac{x+y}{2}\right)+c$ 3) $y=\text{Cot}\left(\frac{x+y}{2}\right)+c$ 4) $y=\sin\left(\frac{x-y}{2}\right)+c$

5. Equation of the curve for which the sub-tangent varies as the reciprocal of the square of the abscissa is

1) $y=c\ e^{x^3/3k}$ 2) $y=c\ e^{x^3/2k}$ 3) $y=e^{x/k}$ 4) $y=c\ e^{k/x}$

6. The number of arbitrary constants in the general solution of a second order differential equation is

1) 1 2) 2 3) 3 4) 4

7. The differential equation of the family of straight lines passing through the origin is

1) y dx – x dy=0 2) y dy + x dx=0 3) y dy – x dx=0 4) y dx + x dy=0

8. R.M.S value of the current I=a sinx over a half wave is

1) a/2 2) $a/\sqrt{2}$ 3) $\sqrt{a}/2$ 4) $\sqrt{a/2}$

9. The area of the region bounded by $a^2y^2=x^2(a^2-x^2)$ is

1) a^2 2) $a^2/3$ 3) $2a^2/3$ 4) $4a^2/3$

10. The volume generated by the rotation of the area bounded by the curve y^2x^3, the y-axis and the lines y=0, y=8 is

1) $\frac{384\pi}{5}$ cu. units 2) 192 cu. units 3) $\frac{384\pi}{7}$ cu. units 4) $\frac{384\pi^2}{7}$ cu. units

11. $\underset{n\to\infty}{\text{Lt}}\frac{1}{n}\left[\text{Sec}^2\frac{\pi}{4n}+\text{Sec}^2\frac{2\pi}{4n}+....+\text{Sec}^2\frac{n\pi}{4n}\right]=$ 1) $\frac{\pi}{2}$ 2) $\frac{\pi}{4}$ 3) $\frac{4}{\pi}$ 4) $\frac{4}{\pi}-1$

12. $\int_0^\infty\frac{\log(1+x^2)}{1+x^2}dx=$ 1) $-\frac{\pi}{2}\log 2$ 2) $-\pi\log 2$ 3) $\frac{\pi}{2}\log 2$ 4) $\pi\log 2$

13. $\int_{1/4}^{1}|2x-1|\,dx=$ 1) 16/5 2) 5/16 3) –5/16 4) 1/8

14. $\int_0^\pi\frac{x\tan x}{\sec x+\tan x}dx=$ 1) $\pi\left(\pi-\frac{1}{2}\right)$ 2) $\pi\left(\frac{\pi}{2}-1\right)$ 3) $\frac{\pi}{2}(\pi-1)$ 4) π^2-1

15. $\int_0^{\frac{\pi}{2}}\sin^6x\cos^4x\,dx=$ 1) $\frac{\pi}{512}$ 2) $\frac{3\pi}{512}$ 3) $\frac{3}{256}$ 4) $\frac{1}{112}$

16. $\int 2e^x\left(\frac{\cos x+\sin x}{1+\cos 2x}\right)dx=$

1) $e^x\sec x+c$ 2) $e^x\cos x+c$ 3) $e^x\tan x+c$ 4) $e^x\sin x+c$

17. $\int x\,e^x\,a^x dx=$ 1) $\frac{(ea)^x}{1+\log a}\left(x-\frac{1}{1+\log a}\right)+c$ 2) $\frac{(ea)^x}{\log(ea)}\left(x+\frac{1}{\log(ea)}\right)+c$

3) $\frac{-(ea)^x}{1+\log a}\left(x-\frac{1}{1+\log a}\right)+c$ 4) $\frac{ea}{x}$

18. $\int \frac{ax+b}{cx+d}\,dx =$

1) $\log\left|\frac{ax+b}{cx+d}\right|+c$ 2) $\frac{ax}{c}+\frac{b}{c}\log|cx+d|+\text{constant}$

3) $\log\left|\frac{ax-b}{cx+d}\right|+c$ 4) $\frac{ax}{c}+\frac{bc-ad}{c^2}\log|cx+d|+\text{constant}$

19. Approximate value of $\sqrt{25.02}$ is

1) 5.002 2) 5.1 3) 5.2 4) 5.02

20. An open top box is to be made out of a piece of card-board measuring 6m × 6m by cutting off equal squares from the corners and turning up the sides, the height of the box for maximum volume is

1) 2.5m 2) 2 m 3) 1m 4) 0.5m

21. Minimum value of x logx is

1) e 2) 1/e 3) $e^{1/e}$ 4) –1/e

22. A kite flying at a height of h feet has x feet of string paid out at time t seconds. If the kite moves horizontally with a velocity V ft/sec, then the rate at which string is being paid is

1) $\frac{v}{x\sqrt{h^2-x^2}}$ 2) $\frac{v\sqrt{h^2-x^2}}{x}$ ft/sec 3) $\frac{v\sqrt{x^2-h^2}}{x}$ ft/sec 4) $\frac{vx}{\sqrt{h^2 * x^2}}$ ft/sec

23. The two curves $y^2=4ax$, $xy=c^2$ cut at right angles if

1) $c^4 = 16a^4$ 2) $c^2 = 32a^4$ 3) $c^4 = 16a^2$ 4) $c^4=32a^4$

24. The angle between the curves $y^2=4ax$ and $ay=2x^2$ at (a, 2a) is

1) $\tan^{-1}\left(\frac{4}{3}\right)$ 2) $\tan^{-1}\left(\frac{3}{5}\right)$ 3) $\tan^{-1}\left(\frac{3}{4}\right)$ 4) $\tan^{-1}\left(\frac{5}{3}\right)$

25. If $y=\sin^{-1}\left(\frac{\sqrt{1+x}+\sqrt{1-x}}{2}\right)$, then $\frac{dy}{dx}=$

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

26. $\frac{d}{dx}\left[\tan^{-1}\frac{x}{\sqrt{1-x^2}}+\sec^{-1}\frac{1}{\sqrt{1-x^2}}\right]=$

1) $\frac{3}{\sqrt{1-x^2}}$ 2) 0 3) $\frac{-2}{\sqrt{1-x^2}}$ 4) $\frac{2}{\sqrt{1-x^2}}$

27. $\frac{d}{dx}\left(\frac{1}{x+\sqrt{x^2-1}}\right)=$ 1) $1-\frac{x}{x^2-1}$ 2) $1-\frac{x}{\sqrt{x^2-1}}$ 3) $1+\frac{x}{\sqrt{x^2-1}}$ 4) $\frac{x}{\sqrt{x^2-1}}$

28. $\frac{d}{dx}\left[\text{Cos}\,(m\sin^{-1}x)\right]=$ 1) $m\cos(m\cos^{-1}x)$ 2) $\frac{m\sin(m\sin^{-1}x)}{\sqrt{1-x^2}}$

3) $m\sin(m\sin^{-1}x)$ 4) $\frac{-m\sin(m\sin^{-1}x)}{\sqrt{1-x^2}}$

29. $\underset{x\to\infty}{\text{Lt}}\left(\frac{x}{1+x}\right)^x=$ 1) 0 2) 1 3) e 4) ∞

30. The latus rectum of hyperbola is 32 and its eccentricity is 5. The equation of the hyperbola is

1) $\frac{9x^2}{4}-\frac{3y^2}{32}=1$ 2) $\frac{4x^2}{9}-\frac{y^2}{24}=1$ 3) $\frac{x^2}{4}-\frac{y^2}{32}=1$ 4) $\frac{x^2}{6}-\frac{3y^2}{5}=1$

31. If P is any point on the ellipse $4x^2 + 16y^2 = 64$ whose foci are S and S^1 then $SP + S^1P=$

1) 16 2) 12 3) 8 4) 4

32. If the latus rectum LL^1 subtends a right angle at the centre of the ellipse, then its e is

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

33. If the angle between the lines joining the foci of an ellipse to an extremity of the minor axis is 90^0, the eccentricity of the ellipse is

1) $\frac{1}{\sqrt{2}}$ 2) $\frac{\sqrt{5}}{2}$ 3) $\frac{1}{\sqrt{3}}$ 4) 1/2

34. Equation of the tangent at the end of the latusrectum in the first quadrant of the parabola $y^2=4x$ is

1) x + y + 1= 0 2) x – y + 1=0 3) x + y – 1=0 4) x + y – 9=0

35. The equation of the parabola with latusrectum joining the points (6, 7) and (6, -1) is

1) $(y-3)^2 = 8(x-8)$ 2) $(y-3)^2 = 8(x-4)$ 3) $(y+3)^2 = 8(x+4)$ 4) $(y-3)^2=4(x+8)$

36. If the area of the triangle satisfies the relation $\Delta = a^2 - (b^2 - c^2)$ then $\tan(A/2)=$
1) ¼ 2) 1/3 3) ½ 4) 1

37. In any ΔABC, $(a+b)^2 \sin^2 (C/2) + (a-b)^2 \cos^2(C/2) =$
1) b^2 2) s^2 3) c^2 4) a^2

38. If P_1, P_2, P_3 are the lengths of altitudes of a Δ ABC then $\frac{1}{P_1^2}+\frac{1}{P_2^2}+\frac{1}{P_3^2}=$
1) Δ 2) $(\cot A + \cot B + \cot C)/\Delta$ 3) $\Delta/(\cot A+\cot B+\cot C)$ 4) $\cot A+\cot B+\cot C$

39. In a ΔABC if the angles are in A.P then $\frac{a+c}{\sqrt{a^2-ac+c^2}}=$
1) $\cos\left(\frac{A-C}{2}\right)$ 2) $2\cos\left(\frac{A+C}{2}\right)$ 3) $\cos\left(\frac{A+C}{2}\right)$ 4) $2\cos\left(\frac{A-C}{2}\right)$

40. If $3\tan^{-1}\left(\frac{1}{2+\sqrt{3}}\right)-\tan^{-1}\left(\frac{1}{x}\right)=\tan^{-1}\left(\frac{1}{3}\right)$ then x =
1) – 1 2) 0 3) 1 4) 2

41. If $\sin[2\cos^{-1}\{\cot(2\tan^{-1}x)\}]=0$ then x=
1) 0 2) $1, \sqrt{2}+1$ 3) $\pm1, -1 \pm\sqrt{2}$ 4) $-1, \pm(\sqrt{2}+1)$

42. Number of solutions of the equation $\sin2\theta - \cos3\theta = 0$ lying in the interval $(0, 2\pi)$ is
1) 2 2) 3 3) 6 4) 1

43. The value of $\cos y \cos\left(\frac{\pi}{2}-x\right)-\cos\left(\frac{\pi}{2}-y\right)\cos x+\sin y\cos\left(\frac{\pi}{2}-x\right)+\cos x\sin\left(\frac{\pi}{2}-y\right)$ is zero if
1) x = 0 2) y = 0 3) x = y 4) $x=\frac{3\pi}{4}+y$

44. The maximum value of $16\cos^5\theta - 20\cos^3\theta + 5\cos\theta$ is
1) – 1 2) – 2 3) 2 4) 1

45. The maximum value of $\cos^2\left(\frac{\pi}{4}+x\right)+(\cos x-\sin x)^2$ is
1) 0 2) 5/2 3) 3/2 4) 10

46. If sec (x – y), secx, sec (x + y) are in A.P then cosx =
1) $2\cos\frac{y}{2}$ 2) $\sqrt{2}\sin\frac{y}{2}$ 3) $\sqrt{2}\cos\frac{y}{2}$ 4) $\cos\frac{y}{2}$

47. $\cos^4\left(\frac{\pi}{8}\right)+\cos^4\left(\frac{3\pi}{8}\right)+\cos^4\left(\frac{5\pi}{8}\right)+\cos^4\left(\frac{7\pi}{8}\right)=$
1) –3/2 2) 3/2 3) 5/2 4) 2/3

48. If $\sin 18^0=\frac{\sqrt{5}-1}{4}$ then $\sin 81^0=$
1) $\frac{\sqrt{3+\sqrt{5}}-\sqrt{5-\sqrt{5}}}{4}$ 2) $\frac{\sqrt{3-\sqrt{5}}+\sqrt{5+\sqrt{5}}}{4}$ 3) $\frac{\sqrt{3+\sqrt{5}}+\sqrt{5-\sqrt{5}}}{4}$ 4) $\frac{\sqrt{3}+\sqrt{5}}{4}$

49. If $x=\frac{2at}{1+t^2}, y=\frac{a(1-t^2)}{1+t^2}$ where a is a constant then
1) $x^2 + y^2 = a^2$ 2) $x^2 + 4y^2 = 4a^2$ 3) $x^2 - y^2 = a^2$ 4) $x^2 + 2y^2 = 3a^2$

50. If A lies in the third quadrant and $\tan A=\frac{4}{3}$ then the value of 3sinA – 4 cosA =
1) 2 1) 1 3) – 1 4) 0

51. If the unit of force is doubled, units of length and time are increased four times, then the unit of mass is increased by
1) 2 times 2) 4 times 3) 6 times 4) 8 times

52. For the equation $F=A^a V^b d^c$, where F is force, A is area, V is velocity and 'd' is density, the dimensional analysis gives a,b,c respectively as
1) 1, 2, 1 2) 2, 1, 1 3) 1, 1, 2 4) 0, 1, 1

53. One vector $\overline{P}$ points vertically up and another vector $\overline{Q}$ points towards east. The direction of $\overline{P}\times\overline{Q}$ is
1) along north 2) along south 3) zero 4) vertically downward

54. If the magnitudes of maximum and minimum resultants of two forces are 9 and 3 respectively, the forces are of magnitudes
1) 7, 2 2) 6, 3 3) 5, 4 4) 8, 1

55. A particle is moving eastward with a velocity of 5 ms^{-1}. In 10 seconds the velocity changes to 5 ms^{-1} northwards. Find the average acceleration in this time
1) $1/\sqrt{2}$ ms^{-2} north-west 2) 1/2 m/s^2 north-west 3) $1/\sqrt{2}$ ms^{-2} east-west 4) 1/2 ms^{-2} east-west

56. A bus accelerates uniformly from rest and acquires a speed of 36 Kmph in 10 seconds. The acceleration is
1) 1 ms^{-2} 2) 2 ms^{-2} 3) 1/2 ms^{-2} 4) 3 ms^{-2}

57. Velocity s-time curve for a body projected upward is
1) parabola 2) ellipse 3) hyperbola 4) straight line

58. Two bodies are projected with same velocity. One body is projected an at an angle 30^0 with horizontal and the other at angle 60^0 to the horizontal, the ratio of maximum heights reached is
1) 3 : 1 2) 1 : 3 3) 1 : 2 4) 2 : 1

59. A passenger in a moving train tossed a coin vertically upwards. The coin falls ahead him in the direction of motion of train. Then the train must be moving with
1) deceleration 2) acceleration 3) uniform velocity 4) none of these

60. A body is freely falling. If the displacement in the last second is equal to the displacement in the first 3 seconds, the time of fall is
1) 9 sec 2) 4 sec 3) 6 sec 4) 5 sec

61. A gun fires a bullet of mass 50 gm with a velocity of 30 ms^{-1}. Because of this the gun is pushed back with a velocity of 1 ms^{-1}. The mass of the gun is
1) 15 Kg 2) 30 Kg 3) 1.5 Kg 4) 20 Kg

62. 5 bullets each of mass 200gm are fired with a velocity of $10ms^{-1}$ into a block of mass 3 Kg at rest in quick succession. If the bullets are embedded in it, the block moves with a velocity of
1) 10 ms^{-1} 2) 20 ms^{-1} 3) 2.5 ms^{-1} 4) 2 ms^{1}

63. Two bodies of masses 2m and m have their kinetic energies in the ratio 8 : 1. Then the ratio of their momenta is
1) 1 : 1 2) 2 : 1 3) 4 : 1 4) 8 : 1

64. A pump lifts 18000 lit of a water to a height of 30m in one hour. If the efficiency of the pump is 75%, the power of the pump is ($g=10\ ms^{-2}$)
1) 2 KW 2) 3KW 3) 4KW 4) 1KW

65. A coconut of mass 1kg falls to the earth from a height of 10m. Its KE when it is 4m from the ground is
1) 39.2J 2) 58.8J 3) 100J 4) 10.8J

66. Frictional force of a surface on polishing it, beyond a certain limit
1) increase 2) decrease 3) decreases more rapidly 4) remains the same

67. A 30 Kg box is to move up an inclined slope of 30^0 to the horizontal at a uniform velocity of 5 m/sec. If the frictional force retarding the motion is 150N, the horizontal force in Newton to move up is ($g=10\ m/s^2$)
1) $300 \times \frac{2}{\sqrt{3}}$ N 2) $300 \times \frac{\sqrt{3}}{2}$ N 3) 300N 4) none

68. The radius of the sphere is 100 cm at 0^0C and 100.1 cm at 100^0C. What is the coefficient of volume expansion of material
1) $3 \times 10^{-5}/^0C$ 2) $30 \times 10^{-5}/^0C$ 3) $0.3 \times 10^{-5}/^0C$ 4) $30 \times 10^{-4}/^0C$

69. There is 2 c.c of mercury at 0^0C in a mercury thermometer between 0^0C and 100^0C marks on the stem is 40 cm and the diameter of the base is 0.032 cm. The coefficient of apparent expansion of mercury is
1) $1613/^0C$ 2) $0.001612/^0C$ 3) $0.0001613/^0C$ 4) $1.613 \times 10^{-9}/^0C$

70. A gas is filled in a vessel at a pressure of 76 cm of Hg. Now one-fourth of original mass of gas leaks out. What will be the new pressure if temperature does not change
1) 60 cm of Hg 2) 10 cm of Hg 3) 57 cm of Hg 4) 76 cm of Hg

71. A sample of O_2 gas and a sample of H_2 gas both have the same mass, the same volume and the same pressure. Assuming them to be perfect gases, the ratio of the temperature of O_2 gas to the temperature of the H_2 gas is
1) 1 : 16 2) 2 :8 3) 3 : 4 4) 4 : 9

72. A water fall is in 84 m high. Assuming that 50% of the kinetic energy of the falling water gets converted to heat, the rise in temperature of water will be
1) 0.098^0C 2) 0.98^0C 3) 89^0C 4) 9.8^0C

73. During an adiabatic expansion of 2 moles of a gas, the change in internal energy was found to be equal to – 100J. The workdone during the process will be equal to
1) zero 2) –100 Joules 3) 200 Joule 4) 100 Joule

74. A sphere, a cube and a thin circular plate, all made of the same material and having the same mass are initially heated to a temperature of 3000^0C. Which of these will cool fastest
1) sphere 2) cube 3) plate 4) none of these

75. Which of the following is true regarding reverberation time
1) reverberation time is less if absorption is more
2) reverberation time is less for high frequency sounds
3) both 1 and 2 4) reverberation time do not on volume of hall

76. Explosive industrial areas will contain the following air pollutants
1) NO_2 2)SO_2 3)both 1and 2 4) CO_2

77. which of the following metal will exhibit car cacogenic effect on human health
1)mercury 2) arsenic 3)chromium 4)iron

78. Carbon monoxide is a
1)Trace gas 2)toxic gas 3)primary air pollutant 4) all the above

79. The amount of fluorides present in pollute water is determined by
1)EDTA method 2)calorie metric method 3)Winkler's method 4)turbidity method

80. The most abundant inert gas in atmosphere is
1)radon 2)nitrogen 3)argon 4)oxygen

81. Which of the following gas will change the colour of lead paintings?
1)SO_2 2)O_3 3)H_2S 4) none

82. Acid rains will cause the following effects?
1)changes the P^H of water 2) affects plant species 3)corrosion of metals 4) all the above

83. Green house effect causes the following
1)raises sea water level 2)soil erosion
3)changes in frequency of rain fall pattern 4)all the above

84. If mercury is present in polluted water it is converted in to the following by bacteria
1)methyl 2) dimethyl mercury 3) both 1 and 2 4)none

85. Which of the following salt is an example for carbonate hardness
1)$CaHCO_3$ 2)Mg (HCO_3) 3)both 1 and 2 4)$CaCl_2$

86. If $Cacl_2$ is present in water causing to hard ness to water is removed by the following method
1)boiling 2)Clark's process 3) addition of sodium carbonate 4)none

87. The chemical formula of calgon is
1)$Na_2[Na_4(Po_3)]_6$ 2)$Na(Po_3)_6$ 3)$Na_2(Po_3)_6$ 4)all the above

88. 1 PPm is equal to
1)1 mg1 lit 2)0.1^0 fr 3)0.07^0cl 4)all the above

89. Zeolite can not be used for
1)highly turbid water 2)acidic water
3) water contains coloured ions like Mn^{2+} and Fe^{2+} 4) none

90. The chemical formula of copperas is
1)$Fe\ So_4\ 7H_2o$ 2)$Fe_2\ So_4$ 3)$Fecl_3$ 4) none

91. In swimming pools disinfect ion is not done by the following method
1)Cl_2 2)UV radiation 3)ozone 4)none

92. The process of coating of zinc power on iron metal is known as
1)tinning 2) anodisation 3)sherardising 4) electroplating

93. Rusting of iron is an example for
1) oxidation 2) reduction 3) not a chemical reaction 4) none

94. During wet corrosion
1)the cathodic area undergoes corrosion 2)anodic are undergoes corrosion
3)no corrosion takes place 4) both anode and cathode undergoes corrosion

95 Current is generated in a galvanic cell due to the following reaction
1)$cu^{2+} + zn \rightarrow cu + zn^{2+}$ 2) $zn + cu^{2+} \rightarrow zn^{2+} + cu$ 3) $zn^{2} + cu \rightarrow zn^{2+} + cu^{2+}$ 4) none

96. In an electrolytic cell, the following reactions takes place
1) reduction 2)oxidation 3)oxidation and reduction 4) anodisation

97. Rusting of iron is catalyzed by
1) H^+ 2)H^- 3)O_2 4)all the above

98. The rate of corrosion increases it the metal contains
1) impurities 2) stressed portions 3)cracks 4)all the above

99. The plastic that is used in the preparation of unbreakable dishes are
1)rubber 2)PVC 3)urea formaldehyde resin 4) isoprene

100. Highly vulcanized rubber is called
1) ebonite 2) buna –S 3)isoprene 4)fibre