ENTRANCE EXAMINATION FOR ADMISSION, MAY 2011.

M.Sc. FIVE YEAR INTEGRATED PROGRAMME (MATHEMATICS, COMPUTER SCIENCE AND STATISTICS)

COURSE CODE : 384

Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 384

Time : 2 Hours | Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you –1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. A town B is 12 km south and 18 km east of another town A. Then the distance of B from A is

(A) $6\sqrt{13}$ (B) $6\sqrt{5}$ (C) $6\sqrt{10}$ (D) 6

2. The parametric equation of the circle $x^2 + y^2 - 8x - 6y + 16 = 0$ is

(A) $(3\cos\theta - 4, 3\sin\theta - 3)$ (B) $(4 + 9\cos\theta, 3 + 9\sin\theta)$

(C) $(4 + 3\cos\theta, 3 + 3\sin\theta)$ (D) $(2 + 3\cos\theta, 3 + 2\sin\theta)$

3. The vertex of the parabola $y^2 - 8y - x + 19 = 0$ is

(A) (3, 3) (B) (4, 4) (C) (3, 4) (D) (4, 3)

4. The condition for the line $y = mx + c$ touches the circle $x^2 + y^2 = a^2$ is

(A) $m^2 = \frac{a^2}{c^2} + 1$ (B) $c^2 = a^2(1 + m^2)$

(C) $a^2 = c^2(1 + m^2)$ (D) $a^2 = \frac{1}{c^2}(1 + m^2)$

5. The latus rectum of an ellipse is equal to half the length of its minor axis. Its eccentricity is

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{\sqrt{3}}{\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2}$ (D) $\frac{1}{2}$

6. The angle between the asymptotes of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is equal to

(A) $\tan^{-1} a$ (B) $\tan^{-1} b$ (C) $\tan^{-1}\frac{b}{a}$ (D) $2\tan^{-1}\frac{b}{a}$

7. The equation of the line passing through the point (2, 3) such that its x intercept equals twice its y intercept is

(A) x+2y=8 (B) 2x+y=7 (C) x+y=5 (D) 3x+y=9

8. If the three lines x–2y+1=0, 2x–5y+3=0 and 5x–9y+k=0 are concurrent, the value of k is

(A) 1 (B) 4 (C) 2 (D) 0

9. The equation of the straight line which passes through the point (2,–3) and cuts off equals intercepts on the axes is

(A) x+y=1 (B) 2x+y=1 (C) x+y+1=0 (D) x–y–5=0

10. If the point $(\frac{9}{16}, \frac{3}{4})$ is one end of the focal chord of the parabola $y^2 = x$; its other end is

(A) $(\frac{1}{9}, -\frac{1}{3})$ (B) $(\frac{1}{9}, \frac{1}{3})$ (C) $(-\frac{1}{9}, \frac{1}{3})$ (D) $(-\frac{1}{9}, -\frac{1}{3})$

11. Equation of the tangent to the parabola $y^2 = 8x$ perpendicular to the line x–3y+8 = 0 is

(A) 9x+3y+2 = 0 (B) 9x+3y–2 = 0

(C) 9x+3y–1 = 0 (D) 9y+3x+2 = 0

12. The locus of a variable point whose distance from (–2, 0) is $\frac{2}{3}$ times its distance from the line $x = -\frac{9}{2}$ is

(A) ellipse (B) hyperbola (C) parabola (D) circle

13. When the eccentricity of an ellipse becomes zero then the ellipse becomes a

(A) straight line (B) pair of straight lines

(C) point (D) circle

14. The value of 'a' so that the curves y = $3e^x$ and y = $\frac{a}{3}e^{-x}$ intersect orthogonally is

(A) (–1) (B) 1 (C) $\left(\frac{1}{3}\right)$ (D) 3

15. The product of length of perpendicular from a point on the hyperbola (4x+3y–1)(3x–4y–2) = 8 to its asymptotes is

(A) 8 (B) $\frac{8}{5}$ (C) $\frac{8}{25}$ (D) 16

16. The area bounded by the curve $y = 2x - x^2$ and the straight line y = –x is given by

(A) $\frac{9}{2}$ (B) $\frac{43}{6}$ (C) $\frac{35}{6}$ (D) $\frac{83}{6}$

17. The volume obtained by revolving the area bounded by $y = \tan(x^2)$ between x = 0 and $x = \frac{\sqrt{\pi}}{2}$ about y–axis

(A) $x = \frac{\sqrt{\pi}}{2}$ (B) $\frac{\pi^2 - \pi \log 4}{4}$ (C) $\frac{\pi^2 - \log 2}{4}$ (D) $\frac{\pi^2 - \pi \log 2}{4}$

18. The length of the curve y = log x between the points whose abscissa are 1 and 3 is

(A) $\sqrt{10} - \sqrt{2} + \log\left(\frac{(\sqrt{2} = 1)(2+\sqrt{10})}{4+\sqrt{10}}\right)$ (B) $\sqrt{10} - \sqrt{2} + \log(\sqrt{2}+1)$

(C) $\sqrt{10} + \sqrt{2} + \log(2+\sqrt{10})$ (D) $\sqrt{10} + \sqrt{2} + \log(4+\sqrt{10})$

19. The eccentricity of the ellipse $4x^2 + y^2 - 8x - 6y - 3 = 0$ is

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{3}{4}$ (C) $\frac{\sqrt{3}}{4}$ (D) $\frac{\sqrt{3}}{2}$

20. If y = $6x - x^2$ and x increases at the rate of 5 units per second, the rate of change of slope when $x = 3$ is

(A) (–90) units/sec (B) 90 units/sec (C) 180 units/sec (D) –180 units/sec

21. If 3x+4y+k = 0 is a tangent to the hyperbola $9x^2 - 16y^2 = 144$, then the value of k is

(A) 0 (B) 1 (C) –1 (D) –3

22. The normal "t" of the rectangular hyperbola xy = 16 meets the x – axis at

(A) $\left(\frac{4}{t} - 4t^3,\ 0\right)$ (B) $\left(0,\ \frac{4}{t} - 4t^3\right)$

(C) $\left(4t - \frac{4}{t^3},\ 0\right)$ (D) $\left(\frac{4}{t^3} - 4t^3,\ 0\right)$

23. The normal drawn at $(-2c, \frac{c}{2})$ to the rectangular hyperbola xy = c^2 meets the curve again at

(A) $\left(\frac{c}{8}, 8c\right)$ (B) $\left(\frac{c}{2}, 2c\right)$ (C) $\left(-\frac{c}{8}, -8c\right)$ (D) $\left(2c, \frac{c}{2}\right)$

24. The critical points of the function f(x) = cos x in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ is at

(A) $x = -\frac{\pi}{2}$ (B) $x = \frac{\pi}{2}$ (C) $x = 0$ (D) $x = \frac{\pi}{4}$

25. If α, β, γ represents the roots of the equation $2x^3 - 5x^2 + x + 9 = 0$, the value of $\alpha^2 + \beta^2 + \gamma^2$ is

(A) 1/4 (B) 5/4 (C) –5/4 (D) 21/4

26. If α and β are the roots of the equation $x^2+4x-7=0$, the equation whose roots are $\frac{\alpha}{1+\alpha}$ and $\frac{\beta}{1+\beta}$ is

(A) $2x^2 + 3x + 7 = 0$ (B) $10x^2 - 18x + 7 = 0$

(C) $2x^2 - 3x - 7 = 0$ (D) $10x^2 + 18x - 7 = 0$

27. If α and β are the roots of the equation $x^2+x+1=0$, then the value of $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$ is

(A) 2 (B) 1 (C) –1 (D) –2

28. If a, b, c are the reciprocals of x, y, z respectively then the value of the determinant $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$ is

(A) (a+1) (b+1) (c+1) (B) abc (1+a+b+c)

(C) abc $(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c})$ (D) $\frac{1}{abc}$ (1+a+b+c)

29. The solution of the system $-10x+2y+3z = 0, 2x-8y+7z = 4$ and $2x + 5y - 6z = 5$ is

(A) (1, 2, 2) (B) $(0, 23, \frac{20}{13})$ (C) (–1, 2, 0) (D) non existent

30. The value of f(x) + f(1–x) if $f(x) = \frac{25^x}{25^x + 5}$ is

(A) 5 (B) 25 (C) 4 (D) 1

31. If $f(x)=\dfrac{6x-3}{2x+4}$, then $f^{-1}(x)$ is

(A) $\dfrac{2x+4}{6x-3}$ (B) $\dfrac{6x-4}{2x+3}$ (C) $\dfrac{4x+3}{6-2x}$ (D) does not exist

32. The period of the function $f(x)=5\cos 3x-2$ is

(A) 2π (B) $\dfrac{\pi}{2}$ (C) $\dfrac{2\pi}{3}$ (D) $\dfrac{\pi}{3}$

33. $\int \tan^{-1}x dx =$

(A) $\sec x \tan x + C$

(B) $x\tan^{-1}x-\frac{1}{2}\log(1+x^2)+C$

(C) $x\tan^{-1}x+\frac{1}{2}\log(1+x^2)+C$

(D) $x\tan^{-1}x+\sec x\tan x+C$

34. The value of $\displaystyle\int_0^{\pi/2}\frac{(\sin x)^{5/2}}{(\sin x)^{5/2}+(\cos x)^{5/2}}dx$ is

(A) $\dfrac{\pi}{4}$ (B) 0 (C) 1 (D) $\dfrac{\pi}{16}$

35. The value of $\displaystyle\int_0^4 f(x)dx$, when $f(x)=\begin{cases}2x, 0<x\le 1\\ \sin\frac{\pi x}{2}, 1<x<3\\ 2x^2-19, 3\le x\le 4\end{cases}$ is

(A) 1 (B) 100/3 (C) 20/3 (D) 32

36. Volume of solid obtained by revolving the area of the ellipse $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$ about major and minor axes are in the ratio

(A) $b^2:a^2$ (B) $a^2:b^2$ (C) a : b (D) b : a

37. The 'c' of Lagranges Mean value theorem for the function f(x) = x^2+2x-1 ; a=0, b=1 is

(A) –1 (B) 1 (C) 0 (D) $\dfrac{1}{2}$

38. If s = $\tan^{-1} t + \cot^{-1} t$, then the velocity of the particles is

(A) 0 (B) s (C) 2s (D) $\frac{2}{1+t^2}$

39. The radius of the spherical bubble is r. The rate of the change of its volume with respect to the radius is

(A) πr^2 (B) $2\pi r$ (C) $2\pi r^2$ (D) $4\pi r^2$

40. A cylinder whose height is always equals to its diameter is increasing in volume at the rate of $60\,cm^2$/sec. At what rate is its radius increasing when its circular base area is 1 m^2?

(A) 1 mm/sec (B) 0.001 cm/sec (C) 2 mm/sec (D) 0.002 cm/sec

41. The maximum value of cos x + sin x is

(A) $\sqrt{2}$ (B) $-\sqrt{2}$ (C) 0 (D) 1

42. If xy = 1, then the minimum value of x + y is

(A) –2 (B) 2 (C) 0 (D) –1

43. In the interval $-\frac{\pi}{2} < x < \frac{\pi}{2}$ the curve $y = \sin^2 x$

(A) is nowhere concave or convex
(B) is convex upwards
(C) has a point of inflection
(D) is concave upwards

44. The value of $\lim_{x\to 0}\left(\frac{4^x - 8^x}{12^x - 24^x}\right)$ is

(A) 1 (B) 0 (C) –1 (D) 2

45. The equation of motion of a particle $s = 2t^2 + \sin 2t$ where s is in metres and t is in seconds. What is its velocity when its acceleration is $2m/\sec^2$?

(A) 61.732 m/sec
(B) $\left(\frac{\pi}{3}+\sqrt{3}\right)$ m/sec
(C) 123.732 m/sec
(D) $\left(\frac{2\pi}{3}+\sqrt{3}\right)$ m/sec

46. A Circular plate expands under the influence of heat so that its radius increases from 12.5 cm. The approximate increase in area is

(A) $3.25\ \pi\ cm^2$ (B) $3.75\ \pi\ cm^2$ (C) $3\ \pi\ cm^2$ (D) $3.05\ cm^2$

47. The area included between the curves $(y-1)^2 = 4x$ and $x^2 = (y-1)$ is

(A) $\left(\frac{1}{3}\right)$ (B) $\left(\frac{4}{3}\right)$ (C) $\left(\frac{8}{3}\right)$ (D) $\left(\frac{16}{3}\right)$

48. Which one of the following statement is true with respect to the curve $y = \frac{x^4}{4} - \frac{5x^2}{2}$?

(A) increasing in $(0, \sqrt{2})$

(B) increasing in $(0, \sqrt{5})$

(C) decreasing in $(0, \sqrt{5})$

(D) decreasing in $(-2\sqrt{5}, 0)$

49. The area bounded by the straight line y = x, the x-axis and the ordinates x = –1 and x = 1 revolves about the x-axis. The volume generated is

(A) $\frac{\pi}{3}$ cubic unit

(B) $\frac{2\pi}{3}$ cube unit

(C) π cubic unit

(D) $\frac{4\pi}{3}$ cubic unit

50. The volume generated by revolving the loop of the curve $y^2(a+x) = x^2(3a-x)$ about the x – axis is given by

(A) $\pi\int_0^{3a}\left(\frac{x^2(3a-x)}{(a+x)}\right)dx$

(B) $\pi\int_{-a}^{3a}\left(\frac{x^2(3a-x)}{(a+x)}\right)dx$

(C) $\pi\int_{-\infty}^{\infty}\left(\frac{x^2(3a+x)}{(a-x)}\right)dx$

(D) $\pi\int_a^{3a}\left(\frac{x^2(3a-x)}{(a+x)}\right)dx$

51. The solution of the equation $|z| = z + 5 + 7i$

(A) z = 3 – 2i (B) $z = \frac{3}{2} + 2i$ (C) $z = \frac{3}{2} - 2i$ (D) $z = \frac{12}{5} - 7i$

52. If ω is a complex cube root of unity, which of the following is not true?

(A) $\omega^3 - 1 = 0$ (B) $1 + \omega + \omega^2 = 0$ (C) $(\omega^2 + \omega)^2 = 1$ (D) $\omega = 1$

53. The value of $i^n + i^{n+3} + i^{n+5} + i^{n+7}$ where n is any positive integer

(A) $i^n(1+i)$ (B) $i^n(1-i)$ (C) i^n (D) 0

54. If $|x+iy| = 1$ then $\dfrac{1+x+iy}{1+x-iy} =$

(A) (4x – iy) (B) 12(x +iy) (C) (x + iy) (D) (2y + ix)

55. If z_1 and z_2 are any two complex numbers then $|z_1+z_2|^2 + |z_1-z_2|^2 =$

(A) $2z_1z_2$ (B) $2\{|z_1|+|z_2|\}$ (C) $2\{|z_1|^2+|z_2|^2\}$ (D) $2\{|z_1|^2-|z_2|^2\}$

56. If $|z| = 3$ then $|z^2+z|$ will be

(A) > 12 (B) > 20 (C) ≤ 12 (D) < 10

57. If arg(x + iy) = θ then arg(–y + ix) is

(A) θ (B) $-\theta$ (C) $(\theta + \frac{\pi}{2})$ (D) $(\theta - \frac{\pi}{2})$

58. If $z^2 = (0, 1)$ then z is

(A) $\frac{1}{\sqrt{2}} \pm \frac{i}{\sqrt{2}}$ (B) $\frac{3}{\sqrt{2}} \pm \frac{i}{\sqrt{2}}$ (C) $\pm\frac{1\pm i}{\sqrt{2}}$ (D) 0

59. If z_1 and z_2 are two complex numbers such that $z_1 \neq z_2$ and $|z_1| = |z_2|$. If z_1 has positive real part and z_2 has negative imaginary part then $\text{Re}\left(\dfrac{z_1+z_2}{z_1-z_2}\right)$ is

(A) Real and positive (B) Real and negative

(C) Zero (D) Cannot be equal to zero

60. The distance between the two complex numbers (2 + 2i) and (3 + i) is

(A) $\sqrt{2}$ (B) 2 (C) 1 (D) $4\sqrt{2}$

61. 4i, (4 + 2i), (–2) are three vertices of a square its fourth vertex is

(A) (–2i) (B) (–2 + 2i) (C) (2 + 2i) (D) (2 – 2i)

62. The value of $[3] +_{11} ([5] +_{11} [6])$ is

(A) $[0]$ (B) $[1]$ (C) $[2]$ (D) $[3]$

63. If $(G,*)$ is a group, then the solution of the equation x * a = b is

(A) x = b * a^{-1} (B) x = a^{-1} * b (C) x = a * b (D) x = b * a

64. If a and b are elements of a group G and $a^2 = e$, $b^2 = e$, ab = ba then $(ab)^2$ is equal to

(A) ab (B) e (C) a^2 (D) b^2

65. If the operation is defined on R – {1} by a * b = a + b – ab for all a, b ∈ R – {1}, then the inverse of a is

(A) $\left(\frac{1}{a}\right)$ (B) $\left(\frac{1}{a-1}\right)$ (C) $\left(\frac{-a}{a+1}\right)$ (D) $\left(\frac{a}{a-1}\right)$

66. If $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}$ then α^{-1} is

(A) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}$ (B) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 1 & 3 \end{pmatrix}$ (C) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 3 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$

67. If the binary operation * is defined as multiplication modulo 7, then 4 * (5 * 6) is equal to

(A) 1 (B) 2 (C) 6 (D) 4

68. If g = $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \end{pmatrix}$ and h = $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 4 \end{pmatrix}$ are two permutations belonging to the symmetric group s_4 then $(h \circ g)(2)$ is

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

69. Which one of the following statements is in corrects?

(A) (Z, .) is a group

(B) (N, +) is a semi group

(C) (N, .) is a monoid

(D) The set of all even integers under usual addition is a group

70. The order of [7] in $(z_9, +_9)$ is

(A) 9 (B) 6 (C) 3 (D) 1

71. If the projection of $\vec{b}$ on $\vec{a}$ is $\vec{a}.\vec{b}$ then $\vec{a}$ is

(A) perpendicular to $\vec{b}$ (B) a unit vector

(C) collinear with $\vec{b}$ (D) parallel to $\vec{b}$

72. If $|\vec{a} \times \vec{b}| = \vec{a} \cdot \vec{b}$ then angle between $\vec{a}$ and $\vec{b}$ is

(A) 0° (B) π (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

73. The two perpendicular sides of a triangle are represented by the vectors $2\vec{i} - \vec{j} + \vec{k}$ and $\lambda \vec{i} - 2\vec{j} - 6\vec{k}$ are respectively, then the area of the triangle is

(A) $\frac{1}{2}\sqrt{16}$ (B) $\frac{1}{2}\sqrt{66}$ (C) $\sqrt{66}$ (D) 66

74. The value of $\tan\frac{\pi}{20}\tan\frac{3\pi}{20}\tan\frac{5\pi}{20}\tan\frac{7\pi}{20}\tan\frac{9\pi}{20}$ is

(A) 1/2 (B) $\frac{\sqrt{3}}{2}$ (C) 1 (D) $\frac{1}{\sqrt{2}}$

75. If $\tan^{-1}(\frac{1}{3}) + \tan^{-1}(\frac{1}{5}) + \tan^{-1}(\frac{1}{7}) = \tan^{-1} x$, then the value of x is

(A) 3/4 (B) 7/9 (C) 12/13 (D) 13/12

76. The general solution of $\cot^2 \theta = 3$ is

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

77. If $u = \cos\left(\frac{x}{y}\right) + \sin\left(\frac{x}{y}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is

(A) 0 (B) u (C) 2u (D) 3u

78. If u $= \sin^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ then $2\left(x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}\right)$ is

(A) tan u (B) cot u (C) $\left(\frac{1}{2}\tan u\right)$ (D) $\left(\frac{1}{2}\cot u\right)$

79. The solution of the differential equation $\frac{dy}{dx}=\frac{1-y}{1-x}$ is

(A) (1–x) (1+y) = c (B) $\frac{1-x}{1-y}=c$

(C) (1–x) (1– y) = c (D) $\frac{1+x}{1-y}=c$

80. The order and degree of the differential equation $\left[\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^2\right]^{\frac{1}{2}}=\frac{d^3y}{dx^3}$ are

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

81. An integrating factor for the differential equation y log y $\frac{dy}{dx}$ + x – log y = 0 is

(A) log (log y) (B) log y (C) $\frac{1}{\log y}$ (D) $\frac{1}{\log(\log y)}$

82. The particular integral of the differential equation $(D^2+16)y=2\cos^2 2x$ is

(A) $\frac{1}{6}\cos^2 2x$ (B) $\frac{x}{8}\sin 4x$ (C) $\frac{1}{16}+\frac{x}{8}\sin 4x$ (D) 1 + x sin 4x

83. The complete solution of the differential equation $(D^2+6D+9)y=4e^{-3x}$ is y =

(A) $\frac{2x}{3}e^{-3x}+(A+Bx)e^{-3x}$ (B) $\frac{e^{-3x}}{9}+Ae^{-3x}+Axe^{-3x}$

(C) $2x^2+Ae^{-3x}+Be^{-3x}$ (D) $(2x^2+A+Bx)e^{-3x}$

84. If $^{15}P_{r-1} : {}^{15}P_{r-2} = 2:1$, the value of r is

(A) 15 (B) 2 (C) 1 (D) 30

85. The number of terms in the expansion of $(a + 2b + 3c)^n$ is 55. The value of n is

(A) 6 (B) 7 (C) 8 (D) 9

86. The value of $C_0+C_2+C_4+.....$ in the expansion of $(1+x)^n$ (where $^nC_r=C_r$) is

(A) 2^n (B) 2^{n+1} (C) 2^{n-1} (D) 2^n-1

87. Probability of sure event is

(A) 0 (B) 1 (C) 1/2 (D) 1/3

88. A fair dice is thrown 3 times. The probability of getting a number larger than the present number in each case is

(A) 20/54 (B) 15/216 (C) 21/216 (D) 5/54

89. If A and B are two finite sets with m and n elements respectively $(m \leq n)$, then the probability of randomly selected mapping from A to B is injective

(A) $^nP_m/ n^m$ (B) $^mP_n/ n^m$ (C) $^nP_m/ m^n$ (D) $^mP_n/ m^n$

90. If a die is thrown once, the expectation of the number on it is

(A) $\frac{1}{6}$ (B) $\frac{7}{2}$ (C) 3 (D) 6

91. If the probability density function of a random variable X is

$$F(x) = \begin{cases} \frac{x}{2} if & 0 \prec x \prec 2 \\ 0 & otherwise \end{cases}.$$ Then E(x) is

(A) 1 (B) $\frac{2}{5}$ (C) $\frac{4}{3}$ (D) 2

92. If $E(x^2) = 5$, $E(x) = 2$, then the variable of X is

(A) 0 (B) 3 (C) 1 (D) 5

93. If the probability density function of a random variable X is $f(x) = 2x$ $(0 < x < 1)$ then the variance of X is

(A) 1 (B) 2 (C) $\frac{5}{12}$ (D) $\frac{1}{3}$

94. In eight throws of a die 5 or 6 is considered a success. Then the mean and standard deviation of success are

(A) 8 and 4 (B) 5 and 6 (C) 8 and 6 (D) $\frac{8}{3}$ *and* $\frac{4}{3}$

95. If a random variable x follows a Poisson distribution such that P(x=1) = P(x=2) and P(x = 0) is

(A) e^{2} (B) e^{-2} (C) $e^{\frac{1}{2}}$ (D) $2\ e^{-2}$

96. In a binomial distribution the mean is 6 and variance is 4. Then the number of trial is

(A) 24 (B) 18 (C) 10 (D) 9

97. A box contains 6 red and 4 white balls. If 3 balls are drawn at random, the probability of getting 2 white balls without replacement, is

(A) $\frac{1}{20}$ (B) $\frac{18}{125}$ (C) $\frac{4}{25}$ (D) $\frac{3}{10}$

98. The distribution function F(x) of a random variable X is

(A) a decreasing function

(B) a non-decreasing function

(C) a constant function

(D) increasing first and then decreasing

99. If f(x) is a p.d.f of a normal distribution with mean μ then $\int_{-\infty}^{\infty} f(x)\,dx$ is

(A) 1 (B) 0.5 (C) 0 (D) 0.25

100. If f(x) is a p.d.f of a normal variate X and X ~ N $\left(\mu, \sigma^2\right)$ then $\int_{-\infty}^{\mu} f(x)\,dx$ is

(A) undefined (B) 1 (C) 0. 5 (D) –0.5
