Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore-641 043

Bachelor's Degree Examination –November 2017

I Semester

Class: I UG
Major: Computer Science/ Computer Applications

Time : 3 hrs.
Max.Marks: 100

15BCSI01/15BCAI01 DSE - I General Mathematics

Part-A **10 x 1 = 10**
Choose the correct answer

1. If $x = at^2$, $y = 2at$ then $\frac{dy}{dx} =$
   a) $\frac{1}{t}$ b) t c) $\frac{2}{t}$ d) $\frac{2}{t^2}$

2. If 2, 3 and α are the eigen values of $A=\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$ then $\alpha =$
   a) 3 b) 2 c) 1 d) 0

3. $\int_0^1 \int_0^2 x^2 y \, dx \, dy =$
   a) 3/2 b) ½ c) 8/3 d) 4/3

4. $\int_0^1 \int_0^2 \int_0^3 dx \, dy \, dz =$
   a) 2 b) 4 c) 6 d) 8

5. Eliminating arbitrary constants in $z = (x+a)(y+b)$, we get
   a) $z = pq$ b) $z = p + q$ c) $z = q/p$ d) $z = px + qy$

6. Eliminating the arbitrary function from $z = f(x^2 + y^2)$, we get
   a) $z = pq$ b) $py - qx = 0$ c) $z = q/p$ d) $z = px + qy$

7. If $f(x) = x$; $-\pi \leq x \leq \pi$ then $a_0 =$
   a) 0 b) 2π c) $\pi/2$ d) $\pi^2/3$

8. If $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx$ then $a_0 =$
   a) $\frac{1}{\pi}\int_0^{\pi} f(x)\,dx$ b) $\int_0^{\pi/2} f(x)\,dx$ c) $\frac{2}{\pi}\int_0^{\pi} f(x)\,dx$ d) $\int_0^{\pi} f(x)\,dx$

9. $L(\sin at)$
   a) $\frac{a}{s^2+a^2}$ b) $\frac{s}{s^2+a^2}$ c) $\frac{a}{s^2-a^2}$ d) $\frac{s}{s^2-a^2}$

10. $L^{-1}\left\{\frac{1}{(s-1)^2}\right\} =$
    a) t^2e^t b) te^t c) t^2 d) $e^t/2$

Part B **5 x 6 = 30**

Answer the following:

11. a) Find the derivative of $y = x^{\sin x}$.

(OR)

b) Differentiate $tan^{-1}\frac{x}{\sqrt{1-x^2}}$ with regard to $sec^{-1}\frac{1}{2x^2-1}$.

12. a) $\iint(x^2+y^2)dx\,dy$ over the region for which x, y are each ≥ 0 and $x+y \leq 1$.

(OR)

b) Evaluate $\int_0^1\int_0^2\int_0^3(x+y+z)\,dx\,dy\,dz$.

13. a) Eliminate the arbitrary constants a and b from $z = (x^2+a)(y^2+b)$.

(OR)

b) Form the partial differential equation by eliminating f from $z = xy + f(x^2+y^2+z^2)$

14. a) Expand $f(x) = x(-\pi < x < \pi)$ as a Fourier Series with period 2π.

(OR)

b) Find a sine series for f(x) = c in the range 0 to π.

15. a) Find L$(te^{-t}\cos t)$.

(OR)

b) Find $L^{-1}\left(\frac{1}{s(s+1)(s+2)}\right)$.

Part C **5 x 12 = 60**

Answer the following:

16. a) If $x^y = y^x$ *then find* $\frac{dy}{dx}$.

(OR)

b) Find the eigen value and eigen vectors of A= $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

17. a) Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}\,dx\,dy$ by transforming into polar co-ordinates.

(OR)

b) Find the value of $\iiint xyz\,dx\,dy\,dz$ through the positive spherical octant for which $x^2+y^2+z^2 = a^2$.

18. a) Solve $\frac{dy}{dx} = \frac{x+y+1}{2x+2y+1}$.

(OR)

b) Form the partial differential equation by eliminating f from $f(x^2+y^2+z^2, x+y+z) = 0$.

19. a) Obtain the Fourier series for the function $f(x) = x^2, -\pi \leq x \leq \pi$.

(OR)

b) Find a cosine series corresponding to the function $f(x) = x$ defined in the interval $(0, \pi)$

20. a) i) Find $L\left(\frac{1-e^t}{t}\right)$

ii) Find $L^{-1}\left(\frac{1}{s(s+1)}\right)$

(OR)

b) Solve the equation

$\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t \ \ given\ that\ y(0) = y'(0) = 0$