

dt :- 17.3.23



S.Y.B.Sc.(IT) SEM-III  
APPLIED MATHEMATICS

Total Marks : 75

NOTE:

- (i) All the questions are compulsory.
- (ii) All the questions carry equal marks.
- (iii) Simple calculator is allowed.

Q-1 Attempt Any Three:

[15]

[1] Find eigen values of the matrix  $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$

[2] Find inverse of  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$ ; Where  $|A| = -18$

[3] Show that  $A = \begin{bmatrix} -8 & 5 \\ 2 & 4 \end{bmatrix}$  satisfies the equation  $A^2 + 4A - 42I = 0$ .

[4] Do as directed:

(i) Write  $\frac{3+2i}{2-3i}$  in standard form  $x + iy$ :

(ii) Write  $e^{i\theta}$  in the polar form.

(iii) Write the De Moivre's Theorem

[5] Find the Modulus and argument of the following:

(a)  $1+i$  (b)  $1-\sqrt{3}i$

[6] Write in the form of  $r(\cos\theta + i\sin\theta)$  : (i)  $-1 + i\sqrt{3}$  (ii)  $\sqrt{3} + i$

Q-2 Attempt Any Three:

[15]

[1] Solve:  $(x+1)\frac{dy}{dx} = x(y^2+1)$

[2] Solve:  $(xy^2+x)dx + (yx^2+y)dy = 0$

[3] Solve:  $(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0$

[4] Solve;  $(y^2 - x^2)dx + 2xydy = 0$

[5] Solve:  $(D^2 - 3D + 2)y = e^{3x}$

[6] Write the order and Degree of the following differential equations:

(i)  $\frac{d^2y}{dx^2} + ax^2 = 0$  (ii)  $x^3\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + y^2 = 0$



[2]

Q-3 Attempt Any Three:

[15]

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

[2] Find  $L^{-1} \left[ \frac{2}{s} + \frac{1}{s^2} + \frac{s}{s^2-9} \right]$

[3] Find  $L^{-1} \left[ \frac{1}{s(s+a)} \right]$  by using convolution theorem.

[4] Find  $L[e^{-t} \cos 4t]$

[5] Find  $L[4t^2 + \sin 3t + e^{2t}]$

[6] Find the Laplace/inverse Laplace transform of the following:

1.  $L[\cos x]$  2.  $L^{-1} \left( \frac{1}{s^2} \right)$  3.  $L^{-1} \left( \frac{1}{s+2} \right)$  4.  $L^{-1} \left( \frac{s}{s^2+2} \right)$  5.  $L[e^{3t}]$

Q-4 Attempt Any Three:

[15]

[1] Evaluate:  $\int_1^2 \int_1^3 xy^2 dx dy$

[2] P.T.  $\int_1^a \int_1^b \frac{1}{xy} dy dx = (\log a)(\log b)$

[3] Evaluate:  $\int_0^4 \int_0^{x^2} e^{\frac{y}{x}} dy dx$

[4] Evaluate:  $\int_0^4 \int_0^x \int_0^{x+y+z} e^{x+y+z} dz dy dx$

[5] Evaluate:  $\int_{-3}^3 \int_0^1 \int_1^2 (x+y+z) dx dy dz$

[6] Evaluate:  $\int_1^3 \int_{\frac{1}{x}}^1 \int_0^{\sqrt{xy}} xyz dz dy dx$

Q-5 Attempt Any Three:

[15]

[1] P.T.  $\beta(m, n) = \beta(m, n+1) + \beta(m, n+1)$

[2] Evaluate  $\int_0^\infty t^{\frac{3}{2}} e^{-t} dt$

[3] Evaluate:  $\int_0^\pi \sin^5 \theta d\theta$

[4] Evaluate  $\int_0^1 x^{\frac{3}{2}} (1-x)^{-\frac{5}{2}} dx$

[5] Evaluate  $\int_0^\pi \sin^2 \theta \cos^4 \theta d\theta$

[6] Evaluate:  $\int_0^\pi \cos^4 \theta d\theta$

X.....X.....X.....X