

S.E. sem-IV (CBSEGS) Elect/ETRX/ENTC
 Applied Mathematics-IV App. Maths-IV 11/12/16

Q. P. Code : 545800

Duration: 3 Hours

(Revised Course)

Total Marks: 80

N.B. : 1) Q.1. is compulsory.

2) Attempt any three from the remaining.

Q.1. a) If $f(x)$ is an algebraic polynomial in x and λ is an eigen value and X is the corresponding eigen vector of a square matrix A then $f(\lambda)$ is an eigen value and X is the corresponding eigenvector of $f(A)$. (5)

b) Find the extremal of $\int_{x_0}^{x_1} (x + y')y' dx$ (5)

c) Express $(6, 1, 6)$ as linear combination of $v_1 = (2, 1, 4)$, $v_2 = (1, -1, 3)$, $v_3 = (3, 2, 5)$. (5)

d) Evaluate $\int_C \frac{z}{(z-1)^2(z-2)} dz$, where C is the circle $|z-2|=0.5$ (5)

Q.2. a) Find the curve $y = f(x)$ for which $\int_0^\pi (y'^2 - y^2) dx$ is extremum if $\int_0^\pi y dx = 1$. (6)

b) Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5 + 4 \cos \theta} d\theta$ (6)

c) Find the singular value decomposition of $\begin{bmatrix} 2 & 3 \\ 0 & 2 \end{bmatrix}$ (8)

Q.3. a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$ and hence, find the matrix represented by $A^3 - 6A^2 + 9A + 4A^3 - 12A^2 + 2A - I$. (6)

b) Construct an orthonormal basis of R^3 using Gram Schmidt process to $S = \{(3, 0, 4), (-1, 0, 7), (2, 9, 11)\}$ (6)

c) Find all possible Laurent's expansions of $\frac{z}{(z-1)(z-2)}$ about $z = -2$ indicating the region of convergence. (8)

[Turnover

274-1