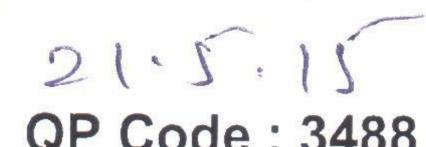


GBGS

(3 Hours)



QP Code: 3488

Total Marks: 80

- N.B. (1) Question No.1 is compulsory.
 - (2) Attempt any three questions out of the remaining five questions.
 - (3) Figures to right indicate full marks.
- Evaluate $\int |z| dz$, where c is the left half of unit circle |z| = 1 from z = -i to z = iQ1.
 - If λ is an Eigen value of the matrix A with corresponding Eigen vector X, prove that (b) λ^n is an Eigen value of A^n with corresponding Eigen vector X.
 - Find the extremal of $\int_{0}^{x_2} \frac{\sqrt{1+y'^2}}{dx} dx$ (c)
 - Find the unit vector orthogonal to both [1,1,0] & [0,1,1] (d)
- Find the curve on which the functional $\int \left[y'^2 + 12xy\right] dx$ with y(0) = 0 & y(1) = 1Q2. (a) can be Extremised.
 - Find the Eigen values and Eigen vectors for the matrix 1 3 1 (b)
 - Obtain two distinct Laurent's series expansions of $f(z) = \frac{2z-3}{z^2-4z+3}$ in powers of (c) (z-4) indicating the region of convergence in each case
- Q3. (a) If $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$, find A^{50} 6
 - Evaluate $\int \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$, where c is the circle |z|=3
 - Using Rayleigh-Ritz method, find an approximate solution for the extremal of the (c)

functional
$$I(y) = \int_{0}^{1} (y'^2 - 2y - 2xy) dx$$
 subject to $y(0) = 2$, $y(1) = 1$.

TURN OVER

JP-Con.: 10054-15.

21.5.15 QP Code: 3488

Find the vector orthogonal to both [-6,4,2] & [3,1,5](a)

and find its minimal polynomial.

Show that the matrix $A = \begin{bmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & -4 & 4 \end{bmatrix}$ is derogatory (b)

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- Reduce the matrix of the quadratic form $6x_1^2 + 3x_2^2 + 3x_3^2 4x_1x_2 + 4x_1x_3 2x_2x_3$ (c) to canonical form through congruent transformation and find its rank, signature, and value class.
- Find the extremal of $\int_{0}^{x_1} \left(2xy y''^2\right) dx$ Q5.
 - Show that the set $W = \{[x, y, z] \mid y = x + z\}$ is a subspace of \mathbb{R}^n under the usual (b) addition and scalar multiplication.
 - -2 2 | is diagonalisable. Also find the Show that the following matrix A = -2(c) diagonal form and a diagonalising matrix.

If $f(a) = \int_{c} \frac{3z^2 + 7z + 1}{z - a} dz$, where c is a circle |z| = 2, find the values of i) f(-3), ii) f(i), iii) f(i)

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Evaluate (b)

Verify Cayley-Hamilton theorem for the matrix A and hence find A^{-1} and A^4 . (c)

Where
$$A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$$

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