SEMIV Examinations May 2022

Curriculum Scheme: Rev-2019 'C' Scheme

Course Code: **EEC401** Course Name: **Engineering Mathematics IV**

Time: 3 hour Max. Marks: 80

==========

Note: Q1, Q2,Q3 and Q4 are carrying 20 equal marks.

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks** **2 marks each**
1.	If x is normally distributed with mean 10 and standard deviation 2, find p $(8 \leq x \leq 10)$
Option A:	0.1113
Option B:	0.3413
Option C:	0.0413
Option D:	0.1013
2.	Find extremals of $\int_{x1}^{x2}(y'^2 - y^2 + 2xy)dx$
Option A:	$c_1 \cos x + c_2 \sin x + x$
Option B:	$c_1 x \cos x + c_2 x \sin x$
Option C:	$c_1 \cos x + c_2 \sin x + x^2$
Option D:	$c_1 \cos hx + c_2 \sin hx + x$
3.	Find value of k if U = (2, 1, 3) and V = (4, 7, k) are orthogonal.
Option A:	K = -4
Option B:	K = 4
Option C:	K = 5
Option D:	K = -5
4.	Evaluate $\int_c \frac{2x+3}{(x+2)(x-3)}$ Where C is circle $\|z\| = 3$.
Option A:	$\frac{3\pi i}{5}$
Option B:	$\frac{-3\pi i}{5}$
Option C:	$\frac{2\pi i}{5}$
Option D:	$\frac{-2\pi i}{5}$
5.	The equations of the two lines of regression are $5x - y = 22$ and $64x - 45y = 24$. Find means for x and$y$.
Option A:	$x = 6, y = 8$
Option B:	$x = 3, y = 8$
Option C:	$x = 4, y = 8$
Option D:	$x = 6, y = 5$
6.	Given $f(z) = \frac{1}{2(z+1)} - \frac{1}{2(z+3)}$ for $1 < \|z\| < 3$, the expansion of $f(z)$ is

Option A:	$f(z) = \cdots + \frac{1}{2z^3} - \frac{1}{2z^2} + \frac{1}{2z} - \frac{1}{6} + \frac{1}{18}z - \frac{1}{54}z^2 + \frac{1}{162}z^3 + \cdots$
Option B:	$f(z) = \cdots + \frac{1}{z^3} - \frac{1}{z^2} + \frac{1}{2z} + \frac{1}{6} - \frac{1}{18}z + \frac{1}{54}z^2 - \frac{1}{162}z^3 + \cdots$
Option C:	$f(z) = \cdots + \frac{1}{2z^3} + \frac{1}{2z^2} + \frac{1}{2z} + \frac{1}{6} + \frac{1}{18}z + \frac{1}{54}z^2 - \frac{1}{162}z^3 + \cdots$
Option D:	$f(z) = \cdots + \frac{1}{2z^3} - \frac{1}{2z^2} - \frac{1}{18}z + \frac{1}{54}z^2 - \frac{1}{162}z^3 + \cdots$
7.	Find cosine of angle between the vectors U = (1, 2, 3, -1) and V = (2, 1, -2, 3)
Option A:	$\frac{5}{\sqrt{270}}$
Option B:	$\frac{-4}{\sqrt{270}}$
Option C:	$\frac{-3}{\sqrt{270}}$
Option D:	$\frac{-5}{\sqrt{270}}$
8.	Given $N = 5, \sum d_i^2 = 8$. Find the rank correlation coefficient R.
Option A:	$R = 0.6$
Option B:	$R = 0.5$
Option C:	$R = 0.4$
Option D:	$R = 0.3$
9.	Find Variance of Binomial distribution with n = 8, p = $\frac{1}{4}$
Option A:	1.1
Option B:	1.5
Option C:	1.2
Option D:	1.3
10.	Find the extremal of $\int_{x_1}^{x_2} \frac{y'}{x^3} dx$
Option A:	$cx^2 = 1$
Option B:	$cx^3 = 1$
Option C:	$cx^3 = 2$
Option D:	$cx^3 = -2$

Q2. (20 Marks)	Solve any Four out of Six.5 marks each
A	Reduce the quadratic form Q =$2x_1^2 + x_2^2 - 3x_3^2 - 8x_2x_3 - 4x_3x_1 + 12x_1x_2$to normal form through linear transformation. Also find rank, index, signature and class value.
B	Construct orthonormal basis of R^2 by applying Gram-Schmidt process. Where S ={(3 , 1), (4 , 2)} .
C	Evaluate $\int_c \frac{dz}{(z^2-4)(z+4)}$ Where C is circle |z| = 4using Cauchy's Residue theorem
D	For normal distribution 30 % items are below 45 and 8 % items are above 64. Find mean and Standard deviation
E	Find extremals of $\int_{x1}^{x2}(y'^2 - y^2 + 2xy)dx$
F	The equation of two lines of regression for bivariate data are 9x+10y−67=0 5x+2y−23=0 Find i) Means values for x&y ii) Regression coefficients iii) Correlation coefficient

Q3. (20 Marks)	Solve any Four out of Six.5 marks each
A	Find extremals of $\int_0^1 (xy + y^2 - 2y^2y')dx$
B	If P(X=x)=$\frac{x}{25}$, x=1,3,5,7,9 Find P(X=1orX=3) and P(4< X < 8)
C	Examine the following vectors are linearly independent if so find relation between them (1,2,3,4),(0,1,0,-1),(1,3,3,3)
D	Find the residues at their poles forf(z)=$\frac{z}{(z+3)(z-1)^2}$
E	Find angle between the vectors U = (6, 2, 4) and V = (2, 0, -3)
F	Calculate the coefficient of correlation between x&y from the data

x	51	54	56	59	65	60	70
y	38	44	33	36	33	23	13

Q4. (20 Marks)	Solve any Four out of Six. 5 marks each
A	Calculate rank correlation coefficient between marks of Test1and Test 2

Test1	52	63	45	36	72	65	45	25
Test2	52	53	51	25	79	43	60	33

B	Evaluate $\int z^2dz$along the upper half of circle |z| = 2
C	Obtain the Laurent series for f(z)=$\frac{z}{(z-1)(z+3)}$ in 1< |z| <3
D	Reduce the quadratic form Q =$3x_1^2 + 3x_2^2 + 3x_3^2 - 2x_2x_3 + 2x_3x_1 + 2x_1x_2$to.normal form through linear transformation. Also find rank, index, signature and class value.
E	By Gram-Schmidt process, find orthogonal basis for u_1=(1,1,1), u_2=(-1,1,0), u_3=(1,2,1)
F	Find extremals of $\int_0^\pi (y'^2 - y^2)dx$