PILLAI COLLEGE OF ENGINEERING, NEW PANVEL
(Autonomous) (Accredited 'A+' by NAAC)
END SEMESTER EXAMINATION
May 2023

BRANCH: ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEM IV

Subject: - Engineering Mathematics IV	**Time: 02.00 Hours**
Max. Marks: 60	**Date:02/05/2022**
N.B 1. Q.1 is compulsory	**Subject Code ET 207**
2. Attempt any two from the remaining three questions	
3. Each Question carry 20 marks.	

Q.1.	**Attempt All**	**Marks**
a)	Construct an Orthomormal basis using Gram-Schmidt process to $S = \{(1,1,1), (-1,1,0), (1,2,1)\}$	5
b)	Fit a binomial distribution to the following data X: 0 1 2 3 4 5 6 f: 5 18 28 12 7 6 4	5
c)	Calculate the Karl Pearson's correlation coefficient from the following data. X: 100 102 108 111 115 116 118 Y: 110 100 104 108 112 116 120	5
d)	Using Rayleigh-Ritz method, solve the boundary value problem $I = \int_0^1 (y'^2 - y^2 - 2xy)\, dx$ given $y(0) = y(1) = 0$	5
Q.2.	**Attempt All**	
a)	Calculate the rank coefficient of correlation from the following data. X: 52 63 45 36 72 65 45 25 Y: 62 53 51 25 79 43 60 33	4
b)	A discrete random variable has the probability density function is given below . X: -2 -1 0 1 2 3 P(X=x): 0.2 k 0.1 2k 0.1 2k Find k, mean and Variance.	4
c)	Using Cauchy residue theorem evaluate $\oint_C \frac{2z-1}{(z+1)(z-3)}\, dz$ where C is the circle $\lvert z\rvert = 4$	6

d)	Using Green's theorem Evaluate $\int_C x^2dx + xy\,dy$ where C is the triangle having vertices A=(0,2), B=(2,0) and C=(4,2).	**6**
Q.3.	**Attempt All**	
a)	The weights of 1000 students are found to be normally distributed with mean 40 kgs. and standard deviation 4 kgs. Find the expected number of students with weight less than 36 kgs.	**4**
b)	Examine whether the given vectors are linearly independent or dependent, if dependent find the relation between them. $[3,1,-4],[2,2,-3],[0,-4,1]$	**4**
c)	Using stokes's theorem evaluate $\int_C \bar{F}.d\bar{r}$ where $\bar{F} = 4y\,i + zj + xk$ and C is the boundary of the surface $x^2 + y^2 = 1 - z$	**6**
d)	Evaluate $\int_C \frac{z}{(z-1)^2(z-2)}dz$, where C is the circle $\lvert z-2\rvert = 2.5$	**6**
Q.4.	**Attempt All**	
a)	Find the extremal of $\int_{x_1}^{x_2} \frac{\sqrt{1+y'^2}}{y}\,dx$	**4**
b)	Find the lines of regression of Y on X from the following data X: 65, 66, 67, 67, 68, 69, 70, 72 Y: 67, 68, 65, 66, 72, 72, 69, 71	**4**
c)	If $v_1 = (0,1,0)$, $v_2 = \left(\frac{-4}{5}, 0, \frac{3}{5}\right)$, $v_3 = \left(\frac{3}{5}, 0, \frac{4}{5}\right)$, show that the vectors are orthonormal. Express u=(1.1.1) as linear combination of v_1, v_2 and v_3	**6**
d)	Find the Laurent's series which represent the function $f(z) = \frac{2z-3}{z^2-4z-3}$ when i) $\lvert z-4\rvert < 1$ ii) $\lvert z-4\rvert > 3$	**6**