UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2020

Programme Name: B. Tech (EPE, ECE, Mech, ADE, Mechatronics) **Semester : III**

Course Name : Statistical and Numerical Methods **Time : 3 Hours**

Course Code : MATH-2037 **Max. Marks : 100**

Nos. of page(s) : 2

Section-A

1. Each question will carry 5 Marks. 2. Select correct answer in each question. 3. All Questions of this section are compulsory.

S. No.		CO
Q1	If the first three central moments are 0, 15,-31 ,the coefficient of skewness is (a)-2.066 (b)-0.53 (c)-0.5 (d)-2.5	CO1
Q2	Wireless sets are manufactured with 25 solders joints each, on the average 1 joint in 500 is defective. How many sets can be expected to be free from defective joints in a consignment of 10000 sets? (a) 7000 (b) 8230 (c) 9512 (d) 6425	CO1
Q3	In 324 throws of a six faced dice, odd points appeared 180 times. The value of z-statistic for checking the fairness of dice is: (a) 1.5 (b) -1.5 (c) -2 (d) 2	CO2
Q4	A positive root of the equation $xlog_{10}x = 4.772393$ lies between (a) 10 and 11 (b) 2 and 3 (c) 4 and 5 (d) 6 and 7	CO3
Q5	Value of the integral $\int_0^1 \frac{x^2}{1+x^3} dx$ using Simpson's 1/3rd formula taking $h = 0.25$ correct to 5 decimal places is (a) 0.23000 (b) 0.23108 (c) 0.23333 (d) 0.24444	CO3
Q6	Solution of $\frac{dy}{dx} = x^2y - 1$, y(0)=1by Taylor's series method at $y = 0.1$ is (a) 1.1 (b) 2.5 (c) 0.55 (d) 0.9	CO4

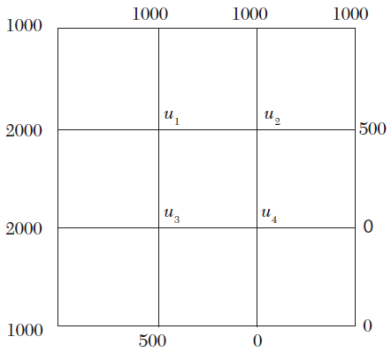
Section-B

1. **Each question will carry 10 Marks. All Questions of this section are compulsory.**

S. No.		CO
Q7	A large number of measurement is normally distributed with a mean 65.5" and S.D. of 6.2". Find the percentage of measurements that fall between 54.8" and 68.8".(Area under standard normal curve between $z = 0$ and $z = 1.73$ is 0.4582 and between $z = 0$ and $z = 0.53$ is 0.2019)	**CO1**
Q8	In a sample of 1000, the mean is 17.5 and the standard deviation is 2.5. In another sample of 800, the mean is 18 and the standard deviation is 2.7. Assuming that the samples are independent, test for significance of difference between their standard deviation and whether two samples could have come from a population.	**CO2**
Q9	From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policy maturing at the age of 63: Age: 45 | 50 | 55 | 60 | 65 Premium (In Rs.) 114.84 | 96.16 | 83.32 | 74.48 | 68.48	**CO3**
Q10	Calculate the value of the integral $\int_4^{5.2} \log_e x \ dx$ from Trapezoidal rule by taking $h = 0.2$.	**CO3**
Q11	Using Runge-Kutta method of fourth order, solve for $y(0.1)$ taking $h = 0.1$ given that $\frac{dy}{dx} = xy + y^2, y(0) = 1.$	**CO4**

Section-C

1. **The question will carry 20 Marks. 2. Choose one question from two options.**

S. No.		CO
Q12	Solve the Laplace equation $u_{xx} + u_{yy} = 0$ at the interior points of the figure below by Gauss Seidal method upto 3 iterations :  **OR** Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial u^2}{\partial x^2}$ with the conditions $u(0,t) = 0, u(x,0) = x(1-x) and\ u(1,t) = 0$ using Schmidt method. Assuming $h = 0.25$, tabulate u for two time levels by choosing appropriate value of k.	**CO4**