**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**

**Instructions: Use of scientific calculator is allowed in this paper.**

**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<br>(a)-2.066<br>(b)-0.53<br>(c)-0.5<br>(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?<br>(a) 7000<br>(b) 8230<br>(c) 9512<br>(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:<br>(a) 1.5<br>(b) -1.5<br>(c) -2<br>(d) 2 | **CO2** |
| **Q4** | A positive root of the equation $xlog_{10}x = 4.772393$ lies between<br>(a) 10 and 11<br>(b) 2 and 3<br>(c) 4 and 5<br>(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<br>(a) 0.23000<br>(b) 0.23108<br>(c) 0.23333<br>(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<br>(a) 1.1<br>(b) 2.5<br>(c) 0.55<br>(d) 0.9 | **CO4** |

## Section-B

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

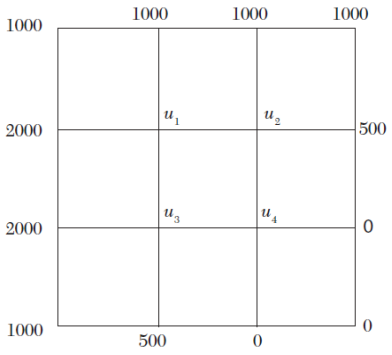
| S. No. | | CO |
|---|---|---|
| Q7 | A large number of measurement is normally distributed with a mean 65.5" and S.D. of 6.2". Find the percentage of measurements that fall between 54.8" and 68.8".(Area under standard normal curve between $z = 0$ and $z = 1.73$ is 0.4582 and between $z = 0$ and $z = 0.53$ 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: | CO3 |

| Age: | 45 | 50 | 55 | 60 | 65 |
|---|---|---|---|---|---|
| Premium (In Rs.) | 114.84 | 96.16 | 83.32 | 74.48 | 68.48 |

| | | | |
|---|---|---|---|
| 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 |