B.E. Mining Engineering (CBCS Pattern) Third Semester

3BEMN05 - Statistical & Numerical Methods

P. Pages : 3 **GUG/W/18/11525**

Time : Three Hours * 3 6 0 5 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Use of non programmable calculator is permitted.

1. a) Use method of false position to find a real root of equation $e^x = 4x$ correct to four places of decimals. **8**

b) Solve by Gauss- Seidal method **8**

$x + 7y - 3z = -22$

$5x - 2y + 3z = 18$

$2x - y + 6z = 22$

OR

2. a) Find a real root of equation $x \log_{10} x = 1.2$ by Newton – Raphson method correct to four places of decimals. **8**

b) Solve by Crout's method. **8**

$3x + 2y + 7z = 4$

$2x + 3y + z = 5$

$3x + 4y + z = 7$

3. a) Use Taylor's series method to find $y(0.1)$ and $y(0.2)$ given $\frac{dy}{dx} = x + y^2, y(0) = 1$ **8**

b) Find $y(0.1)$ and $y(0.2)$ by Euler's modified method if **8**

$10\frac{dy}{dx} = x^2 + y^2,\ y(0) = 1$ taking a step of 0.1

OR

4. a) Use Runge-Kutta 4th order method to find $y(2)$ if **8**

$\frac{dy}{dx} = 2 + \sqrt{xy}\quad y(1) = 1$ taking a step of 0.5

b) Find $y(0.4)$ and $y(0.5)$ by Milne's predictor – corrector method given **8**

$\frac{dy}{dx} = 2e^x - y$ and $y(0) = 2,\ y(0.1) = 2.010\ \ y(0.2) = 2.040,\ y(0.3) = 2.090$.

5. a) A fair die is rolled two times and X be no of sixes. **8**
Find
i) Probability function.
and ii) Distribution function of X

b) A random variable X has density function **8**

$$f(x)=\begin{cases} Kx^2 & , \quad 1\le x\le 2 \\ Kx & , \quad 2<x<3 \\ 0 & , \quad \text{otherwise} \end{cases}$$

Find

i) Constant K

ii) $P(1<x<5/2)$

iii) $P(x>3/2)$

iv) Distribution function.

OR

6. a) A random variable X is defined by **8**

$$X=\begin{cases} -2 & , \quad \text{prob } \frac{1}{3} \\ 3 & , \quad \text{prob } \frac{1}{2} \\ 1 & , \quad \text{prob } \frac{1}{6} \end{cases}$$

Find

i) Mean ii) $E(X^2)$

iii) Var X iv) $E(X^2+5X)$

b) A random variable X has density function. **8**

$$f(x)=\begin{cases} \frac{4x}{81}(9-x^2), & 0\le x\le 3 \\ 0 & , \text{otherwise} \end{cases}$$

Find the coefficients of

i) Skewness ii) Kurtosis

7. a) The probability that a man aged 60 will live to be 70 is 0.65. What is the probability that out of 10 men now 60, **8**

i) At least 7

ii) At most 5

Would live to be 70.

b) The weights of air-mail envelopes are known to be normally distributed with mean weight 1.95 gm and standard deviation 0.05 gm. Out of 200 such envelopes how many you can expect to have weight. **8**

i) 2 gm or more ii) 2.1 gm or less

OR

8. a) Find the coefficient of correlation by rank from the following data. **8**

x	123	127	120	125	131	137	127	124	127	123	128
y	70	68	77	74	81	83	66	68	64	75	71

b) Find the equation of regression plane $z = a + bx + cy$ to the following data. **8**

x:	9	14	17	15	21
y:	4	7	8	11	13
z:	3	5	9	10	12

Also find the value of z at $x = 13$, and $y = 9$.

9. a) i) Prove that $\Delta^2 \cos(2x) = -4\sin^2 h \cos(2x + 2h)$ **4**

ii) Determine the function whose first order forward difference is $x^3 - x + 2$ **4**

b) Find the missing terms in the following data. **8**

x:	0	0.2	0.4	0.6	0.8	1
f(x):	0	0.12	–	1.12	–	3.20

OR

10. a) Using the following table find $\frac{dy}{dx}$ at $x = 2.2$ and $\frac{d^2y}{dx^2}$ at $x = 8$ **8**

x:	0	2	4	6	8
y:	2	8	56	200	488

b) Evaluate **8**

$\int_0^{\frac{\pi}{2}} \frac{\sin x}{x} dx$ by Simpson's $\frac{3}{8}$ th rule by taking 7 ordinates.

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