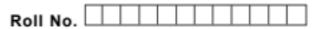


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Total No. of Pages : 03

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M.Sc.(Chemistry) (2015 to 2017) (Sem.-1) MATHEMATICS IN CHEMISTRY Subject Code : MSCH-103 M.Code : 72262

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

- 1. Attempt FIVE questions in ALL including Question no.1 which is COMPULSORY and selecting ONE EACH from Unit I to IV.
- 2. All questions carry EQUAL marks.
- 1. Write briefly :
 - a) Give the drawback of Gauss elimination method.
 - b) Give Newton's backward difference formula.
 - c) Evaluate the first approximation from $\frac{dy}{dx} = x^2 y 1$, y(0) = 1 using Picard's method.
 - d) Using Euler's method, find an approximate value of y(0.2) from $\frac{dy}{dx} = x + y, y(0.1) = 1.22$.

e) Classify the following PDE $x^2 \frac{\partial^2 u}{\partial x^2} + (1-y^2) \frac{\partial^2 u}{\partial y^2} = 0$.

- f) Give regression line x on y and y on x.
- g) Give four properties of normal distribution.
- h) Define null hypothesis by giving suitable example.
- i) Give four properties of F distribution.
- j) Give four properties of χ^2 distribution.

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UNIT-I

2. a) Solve using Gauss elimination method 2x + 2y + z = 12 3x + 2y + 2z = 8, 5x + 10y - 8z = 10.
b) Solve by Jacobi's method 20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25.

3. a) Find
$$\frac{dy}{dx}$$
 at $x = 1.6$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$ from the following data :

x 1.0 1.1 1.2 1.3 1.4 1.5 1.6 y 7.989 8.403 8.781 9.129 9.451 9.750 10.031

b) Evaluate $\int_{0}^{6} \frac{1}{1+x^2} dx$ using Simpson's 1/3 rule.

UNIT-II

4. a) Using Taylor's series method, find value of y (0.2) from $\frac{dy}{dx} = 2y + 3e^x$, y(0) = 0

b) Using modified Euler's method, find value of y (0.3) from $\frac{dy}{dx} = \sqrt{x+y}$, y(0)=1.

5. Using Runge-Kutta method, find value of y (0.2) and y (0.4) from $\frac{dy}{dx} = \frac{y-x}{y+x}$, y(0) = 1.

UNIT-III

6. a) Calculate the coefficient of correlation from the following data :

x	105	104	102	101	100	99	98	96	93	92
y	101	103	100	98	95	96	104	92	97	94

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- b) A has one share in a lottery in which there is 1 prize and 2 blanks; B has three shares in a lottery in which there are 3 prizes and 6 blanks. Compare the probability of A's success to that of B's success.
- a) In sampling a large number of parts manufactured by a machine, the mean number of defective in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain at least 3 defective parts.
 - b) Fit a Poisson distribution to the data:

x 0 1 2 3 4 f 122 60 15 2 1 UNIT – IV

- a) A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing, do the data indicate an unbiased die? (take z_{0.05} = 1.96)
 - b) A sample height of 6400 soldiers has a mean of 67.85 inches and a standard deviation of 2.56 inches while a simple sample of heights of 1600 sailors has a mean of 68.55 inches and a standard deviation of 2.52 inches. Do the data indicate that the sailors are on the average taller than soldiers? (take z_{0.05} = 1.96)
- a) The nine items of a sample have the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from the assumed mean of 47.5? (for v = 8, t_{0.05} = 2.31)
 - b) A set of five similar coins is tossed 320 times and the result is :

No. of heads	20	1	2	3	4	5
Frequency	6	27	72	112	71	32

Test the hypothesis that the data follows a Binomial distribution.

(for $v = 5, \chi^2_{0.05}$ 11.07)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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