

2017

Time: 3 hours

Full Marks: 70

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from **all** the Groups are directed.

Group – A

(Compulsory)

1. Answer the correct alternative for each of the following questions:

1x15=15

- a) In which of the following method, we approximate the curve of solution by the tangent in each interval?
- i. Picard's method
 - ii. Euler's method
 - iii. Newton's method
 - iv. Runge-Kutta method
- b) Jacobi method is also known as:
- i. Displacement method
 - ii. Simultaneous displacement method
 - iii. Simultaneous method
 - iv. Diagonal method

- c) The convergence of which of the following method is sensitive to starting value:
- i. False position
 - ii. Gauss-Seidel method
 - iii. Newton-Raphson method
 - iv. All of these
- d) To perform Chi-square test:
- i. Data conform to a normal distribution
 - ii. Data be measured on a nominal scale
 - iii. Each cell has equal no. of frequencies
 - iv. All of these
- e) Which method is said to be indirect method?
- i. Gauss elimination
 - ii. Newton-Raphson method
 - iii. Regula Falsi
 - iv. Gauss-Jacobi
- f) Which method is said to be direct method?
- i. Gauss elimination method
 - ii. Newton-Raphson
 - iii. Regula-falsi
 - iv. Gauss-Jacobi
- g) The number of significant digits in the no. 204.020050:
- i. 5
 - ii. 6
 - iii. 8
 - iv. 9
- h) Maximum value of correlation is:
- i. 2

- ii. 1.5
 - iii. 1
 - iv. 0
- i) In a poisson distribution, the mean and variance are equal:
- i. True
 - ii. False
- j) Median of 7, 6, 4, 8, 2, 5, 11 is:
- i. 6
 - ii. 12
 - iii. 11
 - iv. 4
- k) If means of 6 numbers is 41 then sum of these numbers is:
- i. 250
 - ii. 246
 - iii. 134
 - iv. 456
- l) Normal distribution is symmetric is about:
- i. Variance
 - ii. Mean
 - iii. Standard deviation
 - iv. Covariance
- m)Skewness of normal distribution is:
- i. Negative
 - ii. Positive
 - iii. 0
 - iv. Undefined
- n) In Binomial probability distribution, dependents of standard deviations must include:

- i. Probability of q
 - ii. Probability of p
 - iii. Trials
 - iv. All of above
- o) In random experiment, observations of random variables are classified as:
- i. Events
 - ii. Composition
 - iii. Trials
 - iv. Functions

Group – B

Answer any **five** questions of the following: 4x5=20

2. Find the approximate values of the roots of the equation $x^3 - x - 1$ using bisection method.
3. Using Simpson's 1/3 rule solve:

$$\int_0^6 dx/(1+x)^2$$

4. Use Picard's method to approximate y when $x = 0.1$ given that $y = 1$ when $x = 0$ and $dy/dx = \frac{(y-x)}{(y+x)}$
5. Find the inverse of $A = \begin{vmatrix} 2 & 6 & 6 \\ 2 & 8 & 6 \\ 2 & 6 & 8 \end{vmatrix}$ matrix by Gauss elimination method.
6. Use the Taylor series method to solve $dy/dx = x + y$; $y(1) = 0$ numerically up to $x = 1.2$ with $h = 0.1$. Compare the final result with the value of the explicit solution.

7. Solve the system equations:

$$x_1 + 2x_2 + 3x_3 = 14$$

$$2x_1 + 5x_2 + 2x_3 = 18$$

$$3x_1 + x_2 + 5x_3 = 20$$

By LU factorization method.

8. Explain Bessel's Interpolation Formula.

Group – C

Answer any **five** questions of the following:

7x5=35

9. Prove Newton – Raphson method formula. Find the real root of the equation $x^2 + 4\sin x = 0$ correct to four places of decimal by using Newton – Raphson method.
10. Prove Simpson's rule, Trapezoidal and Weddell's rule.
11. Use Euler's Modified method to compute y for $x = 0.05$ and $x = 0.1$. Give that $dy/dx = x + y$ with the initial condition $x^0 = 0, y^0 = 1$. Give the correct result up to four decimal places.
12. Prove that mean, variance, mode of Poisson distribution.
if the probability of a bolt of being defective be $1/10$ in a sample of 40 bolts manufactured by a company then find:
 - a) The probability of 10% bolts being defective
 - b) The probability of more than half being defective
 - c) The mean for the probability distribution.
 - d) The variance for the probability distribution.

13. Estimate the missing term in the following:

X	Y
1	2
2	4
3	8
4	?
5	32
6	64
7	128

Explain why the result differs from 16. (Lagrange's formula)

14. Prove the mean, variance and mode of binomial distribution.

A machine is producing 4% defective products. What is the probability of getting exactly 4 defectives in a simple of 100? Use.

- I. Binomial distribution
- II. Poisson distribution

15. Difference between Gauss elimination method and Gauss-Jacobi method.

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