

JK Lakshmipat University, Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), November-December, 2018

B. Tech (All Branches), Semester III

Roll No.....

MA 302/MA402: Computer based Numerical and Statistical Techniques

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write or mark anywhere other than your roll number on question paper.
2. Use of calculator and statistical tables is permitted.

Q.1 Choose the correct answer for the following problems (10 questions @ 1 mark) 10

- i. Newton Raphson method is
 - (a) interval method
 - (b) iteration method \
 - (c) fixed point method
 - (d) (b) and (c) both
- ii. χ^2 is used for;
 - (a) Test of single variance
 - (b) Goodness of fit
 - (c) Test of independence
 - (d) All of these
- iii. Normal distribution is;
 - (a) discrete distribution
 - (b) continuous distribution
 - (c) uniform distribution
 - (d) none of the above
- iv. Jacobi method is;
 - (a) interval method
 - (b) iteration method \
 - (c) elimination method
 - (d) none of these
- v. Euler's method is used for solving;
 - (a) linear simultaneous equations
 - (b) polynomials
 - (c) differential equations
 - (d) none of these
- vi. Level of significance is;
 - (a) Error
 - (b) Probability
 - (c) (a) and (b) both
 - (d) none of these
- vii. Milne method is?
 - (a) fixed point method
 - (b) series method \
 - (c) predictor-corrector method
 - (d) none of these
- viii. Are under a normal curve is;
 - (a) 0
 - (b) 1
 - (c) 100
 - (d) none of these
- ix. $Z_{0.01}$ is;
 - (a) 1.96
 - (b) 1.645
 - (c) 2.576
 - (d) 2.33
- x. The correlation coefficient is denoted by;
 - (a) r
 - (b) $\beta_{\frac{x}{y}}$
 - (c) $\beta_{\frac{y}{x}}$
 - (d) none of these

Q.2 Solve the following problems (4 questions @ 2.5 marks)**10**

- i. Construct the difference table for the following data.

x	0	1	2	3	4	5	6	7
f(x)	1	2	4	7	11	16	22	29

- ii. Subtract 0.9432×10^{-4} from 0.5452×10^{-3} .
- iii. If $P(B) = 0.20$ and $P(A \cap B) = 0.25$, find $P(A | B)$.
- iv. Explain the difference between discrete probability distribution and continuous probability distribution.

Q.3A Find the root of the equation $x^3 - 2x - 5 = 0$ using bisection method lying in the interval (2, 3). Perform till 3 iterations. **05**

Q.3B Use Newton backward interpolation formula to find $f(84)$. **05**

x	40	50	60	70	80	90
f(x)	184	204	226	250	276	304

Q.4A Estimate $f(6)$ using Lagrange's interpolation formula from the following data. **05**

x	3	7	9	10
f(x)	168	120	72	250

Q.4B Estimate the value of the integral $\int_0^1 e^x dx$ by Simpson's 1/3 rule with 6 strips. Compare your result with theoretical result. **05**

Q.5A Solve $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ using modified Euler's method taking $h = 1$. **05**

Q.5B The probability of A, B and C to become MD's of a factory are $5/10$, $3/10$ and $2/10$ respectively. The probabilities that the bonus scheme will be introduced if they become MD's are 0.02, 0.03 and 0.04. Use Baye's theorem to find the probability of A to become MD's if bonus scheme is introduced. **05**

Q.6A In an intelligence test administered to 1000 students, the average score was 42 and the standard deviation was 24. Find the number of students exceeding a score of 50. (Use Normal distribution table) **05**

Q.6B Two independent samples of sizes 9 and 8 gave the sum of squares of deviations from their respective means as 160 and 91 respectively. Can the samples be regarded as drawn from the two normal populations with same variance? Given, $F_{0.05}(8,7) = 3.73, F_{0.05}(7,8) = 3.50$. **05**

Q.7A In testing a certain kind of truck tyre over a rugged terrain, it is found that 25% of the trucks fail to complete the test run without a blowout. Of the next 15 trucks tested, find the probability that fewer than 4 have blowouts. **05**

Q.7B Given $\Sigma x = 146, \Sigma y = 48, \Sigma x^2 = 3550, \Sigma y^2 = 352$, and $\Sigma xy = 1101$. Find the equation of least squares line that approximates the regression of x on y and y on x. Also find the correlation coefficient. **05**

- Q.8 Write down the significance of interpolation in engineering context. Compute $f(16)$ using Sterling's central difference interpolation from the following table. 10

x	0	4	8	12
f(x)	143	158	177	199

OR

- Q.8 In a laboratory experiment, 18 determinations of the coefficient of friction between leather and metal yielded the following results: 0.59, 0.56, 0.49, 0.55, 0.65, 0.55, 0.51, 0.60, 0.56, 0.47, 0.58, 0.61, 0.54, 0.68, 0.56, 0.50, 0.57 and 0.53. At 0.05 level of significance, test the null hypothesis $\mu = 0.55$ against the alternative hypothesis $\mu \neq 0.55$. 10
- Q.9A Apply Gauss Seidel iteration method upto two iterations taking $x_0 = 0 = y_0 = z_0$ to solve the following system of linear equations: 10
 $28x + 4y - z = 32$; $2x + 17y + 4z = 35$; $x + 3y + 10z = 24$.
- Q.9B Explain the following by taking a suitable example. 10
 (a) Level of significance
 (b) Interpolation
 (c) Conditional probability
 (d) Truncation error

OR

- Q.9B To determine whether there really is a relationship between an employee's performance in the company's training programme and his or her ultimate success in the job, the company takes a sample of 400 cases from its very extensive files and obtains the results shown in the following table: 10

Success in job	Performance in training programme			Total
	Low	Average	High	
Poor	23	60	29	112
Average	28	79	60	167
Very good	9	49	63	121
Total	60	188	152	400

Construct $r \times c$ contingency table. Use χ^2 to test the independence of performance in the company's training programme and his or her ultimate success in the job at 1% level of significance.