

Question Paper Code: 41403

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fourth Semester

Mechanical Engineering

14UMA423 - STATISTICS AND NUMERICAL METHODS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(Statistical Tables are permitted)

PART A - (10 x 1 = 10 Marks)

- 1. The null and alternative hypotheses divide all possibilities into
 - (a) two sets that overlap
 - (b) two non-overlapping sets
 - (c) two sets that may or may not overlap
 - (d) as many sets as necessary to cover all possibilities
- 2. The chi-square goodness-of-fit test can be used to test for
 - (a) significance of sample statistics(b) difference between population means(c) normality(d) probability
- 3. In statistical analysis, the burden of proof lies traditionally with
 - (a) the alternative hypothesis (b) the null hypothesis
 - (c) the analyst (d) the facts
- 4. One-way ANOVA is used when
 - (a) analyzing the difference between more than two population means
 - (b) analyzing the results of a two-tailed test
 - (c) analyzing the results from a large sample
 - (d) analyzing the difference between two population means
- 5. The necessary condition to solve a system of equation in iteration model is
 - (a) Lower triangular

- (b) Upper triangular
- (c) Identity (d) Diagonally dominated

6.	The convergent rate of Newton-Raphson method is					
	(a) 0	(b) 1	(c) 2	(d) 4		
7.	For what type of data the divide and different table is used					
	(a) Equal interval		(b) Unequal interval			
	(c) Marginal interva	ıl	(d) All type of interval			
8.	. Interpolation is used to find					
	(a) Missed data		(b) Assembled data			
	(c) Repeated data		(d) None of these			
9.	9. When can we use Simpson's 1-3 rule					
	(a) odd	(b) Even	(c) Multiple of three	(d) None of these		
10. The Gaussian quadrature formula is also knows as						
	(a) Forward form		(b) Divided different form			
	(c) Three point for	m	(d) Backward form			
PART - B (5 x 2 = 10 Marks)						

- 11. What is a null hypothesis?
- 12. What are the advantages of a Latin square design?
- 13. Solve the following system of equations, using Gauss Jordan elimination method 2x + y = 3, x 2y = -1.
- 14. State Newton's forward interpolation formula.
- 15. Find the area under the curve passing through the points (0, 0), (1, 2), (2, 2.5), (3, 2.3), (4, 2) (5,1.7) and (6, 1.5).

PART - C (5 x
$$16 = 80$$
 Marks)

16. (a) A real estate agency wants to compare the appraised values of single-family homes in two cities in Michigan. A sample of 60 listings in Lansing and 99 listings in Grand Rapids yields the following results (in thousands of dollars):

	Lansing	Big Rapids
X	191.33	172.34
S	32.60	16.92
n	60	99

Is there evidence of a significant difference in the average appraised values for singlefamily homes in the two Michigan cities? Use 0.05 level of significance. (16)

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(b) A survey of 320 families with 5 children shows as following:

Boys	5	4	3	2	1	0
Girls	0	1	2	3	4	5
Families	18	56	110	88	40	8

Given that the value of χ^2 for 5 degree of freedom are 11.1 and 15.1 at 95% and 99% significance level respectively. Test the hypothesis that male and female births are equally probable. (16)

17. (a) The following Latin square of a design when 4 varieties of seeds are being tested. Set up the analysis of variance table and state your conclusion. (16)

A 105	B 95	C 125	D 115
C 115	D 125	A 105	B 105
D 115	C 95	B 105	A 115
B 95	A 135	D 95	C 115

Or

- (b) Compare and contrast the Latin square design with the Randomised Block Design. (16)
- 18. (a) (i) Using Newton Raphson method, solve $x \log_{10} x = 12.34$ taking the initial value x_0 as 10. (8)
 - (ii) Solve by Gauss elimination method the following system 3x + 4y + 5z = 18; 2x - y + 8z = 13; 5x - 2y + 7z = 20. (8)

Or

- (b) Solve the following system of equations using Gauss Seidel iterative method: 27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110. (16)
- 19. (a) Using Newton's forward interpolation formula, find the polynomial f(x) satisfying the following data. Hence evaluate f(x) at x = 5. (16) $x : 4 \ 6 \ 8 \ 10$

$$f(x): 1 \quad 3 \quad 8 \quad 10$$

Or

(b) Using Newton's divided difference, find f(2), f(8) and f(15) from the following data:

X
:
4
5
7
10
11
13

$$f(x)$$
:
48
100
294
900
1210
2028

(16)

20. (a) The table given below gives the velocity V of a moving particle at time t seconds. Find the distance covered by the particle in 12 seconds and also the acceleration at t = 2 seconds using Simpson's rule. (16)

(b) The population of a certain town is given below. Find the rate of growth of the population in 1931, 1941, 1961 and 1971.

Year x	:	1931	1941	1951	1961	1971
Population	e y :	40.62	60.80	79.95	103.56	132.65

(16)