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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

(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 (8)
 $3x + 4y + 5z = 18; 2x - y + 8z = 13; 5x - 2y + 7z = 20.$

Or

(b) Solve the following system of equations using Gauss Seidel iterative method:

$$27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110. \quad (16)$$

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)

$x : 4 \quad 6 \quad 8 \quad 10$

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

Or

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

$X : 4 \quad 5 \quad 7 \quad 10 \quad 11 \quad 13$

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

(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)

X	:	0	2	4	6	8	10	12
V	:	4	6	16	34	60	94	136

Or

- (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
$Population\ y$:	40.62	60.80	79.95	103.56	132.65

(16)