Question Paper Code : 71778

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Fourth Semester

Mechanical Engineering

MA 2266/MA 42/MA 1254/080120014/10177 SN 401 — STATISTICS AND NUMERICAL METHODS

(Common to Automobile Engineering and Production Engineering)

(Regulation 2008/2010)

(Common to PTMA 2266 – Statistics and Numerical Methods for B.E. (Part-Time) Second Semester – Production Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

Statistical tables may be permitted.

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define Type I and Type II errors.
2. Give two uses of Chi-square distribution.
3. Is 2×2 Latin square design possible? Why?
4. What is the main advantage of LSD over RBD?
5. What is the order of convergence and the condition of convergence of Newton Raphon method?
6. Solve the system of equations by Gauss elimination method : $11x + 3y = 17$, $2x + 7y = 16$.
7. Write down Newton's backward difference formula for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$.
8. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Trapezoidal rule taking $h = 1$.
9. Using Euler's method, find $y(0.2)$ if $y' = x + y$, $y(0) = 1$.
10. Distinguish between Runge-Kutta method and predictor-corrector method.

the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% of level of significance? (8)

(ii) A random sample of 10 boys had the following IQs :

70, 120, 110, 101, 88, 83, 95, 98, 107, 100.

Does the data support the assumption of a population mean IQ of 100? (8)

Or

(b) (i) The theory predicts the proportion of the beans in the four groups. A, B, C and D should be 9 : 3 : 3 : 1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory? (8)

(ii) Two independent samples of 8 and 7 items respectively had the following values of the variable :

Sample 1	9	11	13	11	15	9	12	14
Sample 2	10	12	10	14	9	8	10	

Do the two estimates of population variance differ significantly at 5% level of significance? (8)

12. (a) A completely randomized design experiment with 10 plots and 3 treatments gave the following results.

Treatment	Yield
A	5 7 3 1
B	4 4 7
C	3 5 1

Analyse the results for treatment effects. (16)

Or

(b) The following data resulted from an experiment to compare three burners A, B, C. A Latin square design was used as the tests were made on 3 engines and were spread over 3 days.

A16	B17	C20
B16	C21	A15
C15	A12	B13

Test the hypothesis that there is no difference between the burners. (16)

13. (a) (i) Find a real positive root of the equation of $3x - \cos x - 1 = 0$ to four decimal places using Newton-Raphson method. (8)

(ii) Using Gauss-Seidal iterative method, solve the following system of equations : $8x - 3y + 2z = 20$; $4x + 11y - z = 33$; $6x + 3y + 12z = 35$. (8)

Or