Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 714903 **Date: 24-06-2014**

Subject Name: Application of Statistical Techniques and Numerical Methods

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** 1. The velocity of a train which starts from rest is given by the following table, the time being reckoned in minutes from the start and the speed in km/hour. **07**

t(minutes)	2	4	6	8	10	12	14	16	18	20
v(km/hr)	16	28.6	40	46.2	51.2	32.0	17.4	8	3.2	0

Estimate approximately the total distance run in 20 minutes.

(b) What is the probability that a randomly chosen card from a deck of cards will be either a king or a heart? **07**

Q.2 **(a)** Evaluate $\int_0^1 \sin\left(\frac{\pi}{2}x\right)dx$ with n = 4, using Trapezoidal rule. **07**

(b) Explain Romberg integration and find R_{22} using Romberg integration to evaluate $\int_0^{1.2} \frac{1}{1+x}dx$. **07**

OR

(b) A probability that an applicant for a Management Accountantôs job has a post graduate degree is 0.3, he has had some work experience as a chief financial Accountant is 0.6 and that he has both is 0.2 out of 350 applicants approximately, what number would have either a post graduate degree or some professional work experience? **07**

Q.3 **(a)** Explain the terms Probability, Standard Deviation, Variance with one engineering example. **07**

(b) Evaluate $\int_0^1 x dx$ by Gauss quadrature of two points. **07**

OR

Q.3 **(a)** Given $\frac{dy}{dx} = x^3 + y, y(0) = 1$, compute y(0.2) by Eulerôs method taking h = 0.01. **07**

(b) Apiece of equipment will function only when the three components A, B and C are working. The probability of A failing during one year is 0.15 that of B failing is 0.05 and that of C failing is 0.10. What is the probability that the equipment will fail before the end of the year? **07**

Q.4 **(a)** Solve the following system by choleskyôs method: **07**

$$4x+6y+8z=0$$
$$6x+34y+52z=-160$$
$$8x+52y+124z=-452$$

(b) Explain the application of Numerical methods in engineering in details by using an appropriate example **07**

OR

Q.4 **(a)** Explain the application of stastical methods in engineering in details by using an appropriate example **07**

(b) Using Runge-Kutta method, find an approximate value of y for x = 0.2, if $\frac{dy}{dx} = x + y^2$, , gives that y =1, when x = 0. **07**

Q.5 **(a)** Solve the following using Runge-Kutta Methods -fourth order Method $y' = x + y; y(0) = 1,$ at $x = 0.2$ **07**

(b) Find the smallest eigenvalues of the matrix by using Power method **07**

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}.$$

OR

Q.5 **(a)** Evaluate $\int_0^1 \sin\left(\frac{\pi}{2}x\right)dx$ with n = 4, using Trapezoidal rule. **07**

(b) Solve the following system by Gauss-elimination **07**

$$10x+y+z=12$$
$$2x+10y+z=13$$
$$2x+2y+10z=14$$

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