G 7114 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fifth Semester

Branch—Computer Science and Engineering/Information Technology

ENGINEERING MATHEMATICS—IV (R, T)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **one** *question from each module.*
All questions carry equal marks.

Module I

1. (a) With usual notation, show that probability distribution of Queue-length is given by $\rho^n (1 - \rho)$ where $\rho = \frac{\lambda}{\mu} < 1$ and $n \geq 0$.

(10 marks)

(b) People arrive at a Theatre ticket booth in Poisson distributed arrival rate of 25 per hour. Service time is constant at 2 minutes. Calculate (a) the mean number in the waiting line ; (b) the mean waiting time ; (c) the utilisation factor.

(10 marks)

Or

2. (a) Derive Little's formula. (10 marks)

(b) A petrol station has two pumps. The service time follows exponential distribution with mean four minutes and cars arrive for service in a Poisson process at the rate of 10 in cars per hour. Find the probability that a customer has to wait for service. What proportion of time do the pumps remains idle ?

(10 marks)

Module II

3. (a) Solve by Newton's method $e^x = 4x$. (8 marks)

(b) Solve by Gauss Seidel method :

$8x - 3y + 2z = 20$; $4x + 11y - z = 33$; $6x + 3y + 12z = 35$.

(12 marks)

Or

Turn over

4. (a) Determine the root of $xe^x - 3 = 0$ correct to 3 decimal places using Regula-Falsi method.

(10 marks)

(b) Solve by Jacobi's method :

$27x + 6y - z = 85$; $6x + 15y + 2z = 72$; $x + y + 54z = 110$.

(10 marks)

Module III

5. (a) Using Newton's divided difference formula find the value of $f(8)$ given :

x :	4	5	7	10	11	13
$f(x)$:	48	100	294	900	1210	2028

(10 marks)

(b) Using Simpson's 1/3 rule evaluate $\int_0^2 \frac{dx}{1+x^3}$ to two decimal places by dividing the range into 4 equal parts.

(10 marks)

Or

6. (a) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 3.8$ from the following :—

x :	3	3.5	4	4.5
z :	1.4843	1.55023	1.60746	1.65801

(10 marks)

(b) Using Trapezoidal rule evaluate $\int_1^2 \frac{dx}{x}$ by dividing the interval into 5 equal parts. (10 marks)

Module IV

7. (a) Using dual simplex method solve :

Maximize $Z = 6x_1 + 4x_2 + 4x_3$

subject to

$$3x_1 + x_2 + 2x_3 \geq 2$$
$$2x_1 + x_2 - x_3 \geq 1$$
$$-x_1 + x_2 + 2x_3 \geq 1$$

(10 marks)

(b) Use Big M-method to solve :

Minimize $Z = 4x_1 + 3x_2$

subject to $2x_1 + x_2 \geq 10$

$-3x_1 + 2x_2 \leq 6$

$x_1 + x_2 \geq 6.$

(10 marks)

Or

8. (a) Using Graphical method solve :

Minimize $Z = 3x_1 + 2x_2$

subject to $5x_1 + x_2 \geq 10$

$x_1 + x_2 \geq 6$

$x_1 + 4x_2 \geq 12$

(10 marks)

(b) Using Simplex method solve :

Maximize $Z = 4x_1 + 10x_2$

subject to $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

(10 marks)

Module V

9. (a) Explain an algorithm for solving a transportation problem. (10 marks)

(b) Using Vogel's approximation method find the solution of :

		Destination			
		A	B	C	*Supply*
Source	1	2	7	4	5
	2	3	3	1	8
	3	5	4	7	7
	4	1	6	2	14
	Demand	7	9	18	34

(10 marks)

Or

10. (a) Describe the method of solving an unbalanced transportation problem. (10 marks)

(b) Solve the transportation problem :

		To			
		A	*B*	*C*	*Availability*
From	I	50	30	220	1
	II	90	45	170	3
	III	250	200	50	4
Requirement		4	2	2	

(10 marks)

[5 × 20 = 10 marks]