

12/12/11

SE IT Sem-III (OTR)
 Foundation of Information Technology
 MP-4472

86: 2nd Half-Exam.-11 min (a).

Con. 6102-11.

(OLD COURSE)

(3 Hours)

[Total Marks : 100

- N. B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from question Nos. 2 to 7.

1	a) What are the applications of Information Technology.	05
	b) What do you mean by software quality assurance?	05
	c) What is Data ware housing and data mining?	05
	d) What is an internet?	05
2	a) What is meant by a digital computer? Draw a Schematic to show various functional units of a digital computer.	10
	b) Explain the various classification of computer system.	10
3	a) What do you mean by Memory Devices? Explain the differences between the Primary and Secondary memory.	10
	b) What are the various program development methodologies?	10
4	a) Describe the significance of network.	10
	b) Explain the significance of Internet.	10
5	Explain the following(05 Marks each) a) Gateways b) Routers c) ISDN d) Network Access Protocols.	20
6	a) What are search engines.	05
	b) What are the advantages of E-Commerce?	05
	c) What is GIS.	05
	d) What is Virus ? How to prevent a virus.	05
7	Write notes on any two :- a) Cryptography. b) World wide Web. c) Digital Modulation. d) Categories of E-Commerce system ,	20

Con. 6308-11.

(OLD COURSE)

MP-4495

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.
 (2) Attempt any **four** questions from remaining **six** questions.
 (3) Assume **suitable** data if **necessary** with proper **justification**.

I. [20]

- A) In the network shown in fig.1, when $R = 1 \Omega$, $I = 2 \text{ A}$; when $R = 2 \Omega$, $I = 1 \text{ A}$. Find 'V', when $R = \infty$

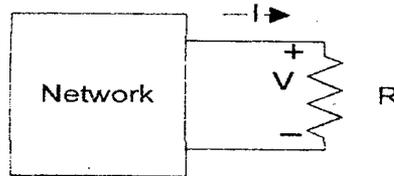


Fig.1.

- B) A capacitor with initial voltage will act as a voltage source at $t = 0+$. Justify:
 C) For a 2 – port network, derive the condition for symmetry in terms of T parameters
 D) What are the properties Hurwitz polynomial ?

II. A) Obtain current through 10Ω resistor in fig.2 by Super position theorem. [10]

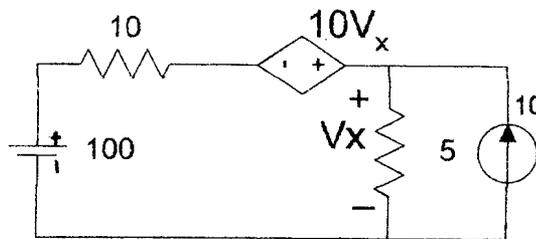


Fig.2.

II. B) Obtain Thevenin's equivalent circuit between terminals X and Y in fig. 3. [10]

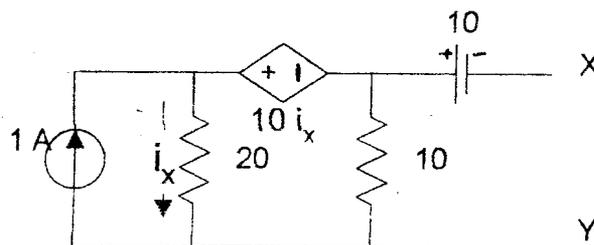


Fig.3.

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- III. A) The network shown in fig-4, is in steady state with the switch K closed. At $t=0$, the switch is opened. Find the values for v_K , and dv_K/dt at $t=0+$. [10]

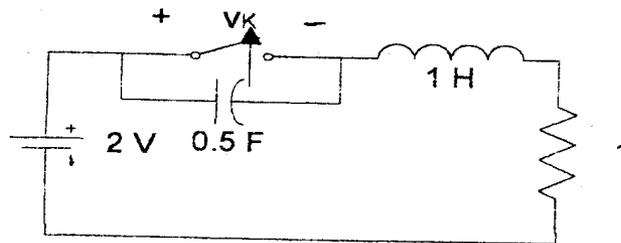


Fig. 4.

- III. B) In the network shown in fig-5, initially the switch is in position 'a' for a long time to establish a steady state at position 'a'. At $t=0$, the switch is changed to position 'b'. Obtain the expressions for $v_x(t)$. [Given $v(t) = \delta(t)$] [10]

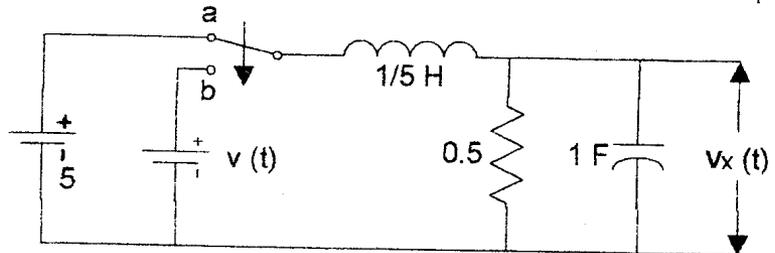


Fig. 5.

- IV. A) For the two port network shown in fig-6, determine the h parameters. [10]

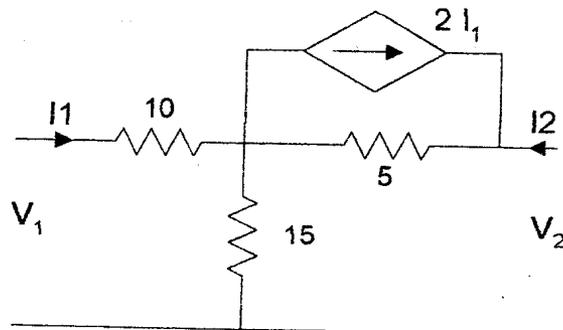


Fig. 6.

- IV. B) Explain parallel connection of 2-port networks. If two 2-port networks are connected in parallel, explain how to obtain the equivalent Y parameters. [10]

- V. A) Sketch bode plot for the following transfer function :

$$G(s) H(s) = \frac{(s+10)(s+50)}{s(s+5)(s+25)}$$

[10]

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V. B) Which of the following are Hurwitz ? [10]

- i. $s^5 + 8s^4 + 24s^3 + 28s^2 + 23s + 6$
- ii. $s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

VI. A) Test the following functions for positive realness: [10]

- i. $Y(s) = \frac{1 + 4s + 3s^2}{1 + 3s + 1.25s^2}$
- ii. $Z(s) = \frac{(s + 1)(s + 3)}{(s + 0.5)(s + 2.5)}$

VI. B). Synthesize the following function in foster I and cauer II form:- [10]

$$Z(s) = \frac{(s + 1)(s + 4)}{s(s + 2)}$$

VII. A) Linear graph of a network is shown in fig-7. For the given tree, obtain:-

- i. incidence matrix
- ii. fundamental cut set matrix
- iii. fundamental tie set matrix [10]

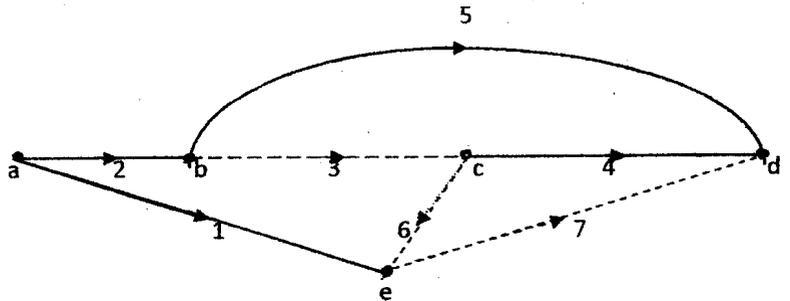


Fig-7.

VII. B) Explain Dual of a network. Draw the Dual of the network shown in fig-8 [10]

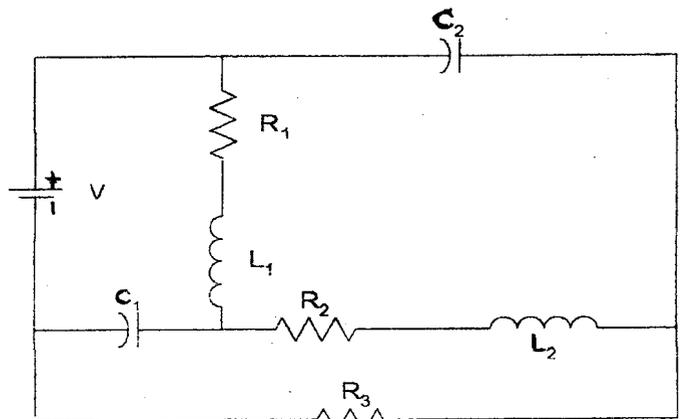


Fig -8.

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SE (ETRX, EXTC) (OTR) Sem-III
Numerical Techniques

49 : 2nd half.11-AM(d)

Con. 6111-11.

(OLD COURSE)

MP-4474

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Attempt any **five** Questions.
 (2) Question No. 1 is **compulsory**.
 (3) **Each** question carry **equal** marks.

1. (a) Define the different types of errors with examples. 20
 (b) Explain pitfalls and describe the methods to choose the linear algebraic equations.
 (c) Explain Forward difference, Backward difference, Divided difference and Central difference.
 (d) Explain methods based on Interpolation in Numerical Differentiation.
2. (a) Use zero, 1st, 2nd, 3rd and 4th order Taylor series expansions to approximate the 8
 functions :
 $f(x) = 0.1x^4 - 0.15x^3 - 0.5x^2 - 0.25x + 1.2$ from $x_i = 0$ with $h = \pm 1$. That is predict the function value at $x_{i+1} = 1$. State truncation error in each case.
 (b) Obtain the smallest positive root of the following equation correct to four significant 12
 digits.
 $x^3 - x - 4 = 0$
 Use : (i) Regula Falsi Method and
 (ii) Secant Method.
3. (a) Use Newton Raphson method to obtain a root to three decimal places of the 10
 following equation :
 $x \sin x + \cos x = 0$
 Derive the formula used.
 (b) Solve the following system of equations using Gauss Seidel Iterative method. 10
 $10x - 2y - z - t = 3$
 $-2x + 10y - z - t = 15$
 $-x - y + 10z - 2t = 27$
 $-x - y - 2z + 10t = -9$
4. (a) From the following table, find the number of students who 8
 (i) Obtained less than 45 marks
 (ii) Obtained more than 65 marks

Marks	30-40	40-50	50-60	60-70	70-80
Number of Students	30	41	52	36	31

[TURN OVER

- (b) Using Lagrange's formula, find a polynomial that satisfies $P(1) = 1$, $P(3) = 27$ and $P(4) = 64$ and hence evaluate $P(2)$. 8
- (c) Derive Simpson's $\frac{3}{8}$ rule formula in Numerical Integration. 4
5. (a) Evaluate the integral $I = \int_0^1 \frac{1}{(1+x)} dx$ with $h = \frac{1}{6}$ by using Simpson's $\frac{1}{3}$ rd and $\frac{3}{8}$ th rule and compare the results. Also comment on the results. 10
- (b) Using 4th order Runge Kutta method, Integrate, 10
- $$\frac{dy}{dx} = f(x, y) = -2x^3 + 12x^2 - 20x + 8 \cdot 5$$
- using a step size of 0.5 and an initial condition of $y = 1$ at $x = 0$.
6. (a) Write Runge-Kutta Second order and Fourth order Formula. 4
- (b) Applying Simplex method, find the minimum of $f = x_1 - 2x_2$ subject to the following constraints, 8
- $$0 \leq x_1$$
- $$0 \leq x_2$$
- $$x_1 + x_2 \leq 4$$
- $$-x_1 + x_2 \leq 1$$
- $$x_1 + x_2 \leq 3$$
- (c) Solve the equation using Gauss Jordan Method 8
- $$2x_1 + x_2 + 2x_3 + x_4 = 6$$
- $$6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$$
- $$4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$$
- $$2x_1 + 2x_2 - x_3 + x_4 = 10$$
7. (a) Explain Golden Section Search optimization ? 4
- (b) Use Predictor - Corrector formula for tabulating the solution of 8
- $$10 \frac{dy}{dx} = x^2 + y^2, y(0) = 1, \text{ for the range } 0.5 \leq x \leq 1.0$$
- (c) From the following table, find x , correct to two decimal places, for which y is maximum and also find the maximum value of y . 8

x	1.2	1.3	1.4	1.5	1.6
y	0.9320	0.9636	0.9855	0.9975	0.9996

Con. 6110-11.

(OLD COURSE)

MP-4507

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.
 (2) Solve any four questions.
 (3) Each question carries equal marks.

Q: 1 a) Among the first 500 integer

Determine the integer which is not divisible 2 nor 3 nor 5

[05]

b) Solve the Recurrence relation $d_n = 4(d_{n-1} - d_{n-2})$ subject to the initial condition $d_0 = 1 = d_1$

[05]

c) Consider the following (2, 5) encoding function e.

$$\left. \begin{aligned} e(00) &= 00000 \\ e(10) &= 00111 \\ e(01) &= 01110 \\ e(11) &= 11111 \end{aligned} \right\}$$

Code words. Find the minimum distance of the code. [05]

d) Determine whether the following graph is planner or not and verify Euler's formula.

[05]

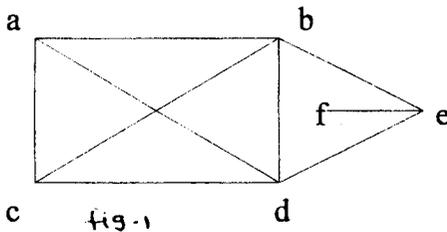
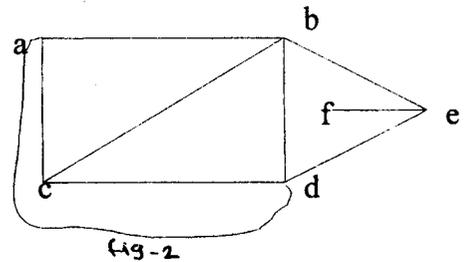


Fig 1
can be
redrawn
as fig 2



Q: 2a) Using the law of logic simplify $\sim(p \wedge q) \Rightarrow [\sim p \vee (\sim p \vee q)]$.

[05]

b) If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ then prove by mathematical induction that

$$A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix} \text{ for all } n \in \mathbb{N}$$

[05]

c) Let $A = \{1, 2, 3, 4, 8\}$ $B = \{1, 4, 6, 9\}$. Let a R b if and only if (a/b).

Write the relation in Matrix form.

[05]

d) Let R and S be the given relation from A to B Compute

$$R^c, R \cap S, R \cup S, S^{-1} \quad A = B = \{1, 2, 3\}$$

$$R = \{(1,1), (1,2), (2,3), (3,1)\} \quad S = \{(2,1), (3,1), (3,2), (3,3)\}$$

[05]

Q: 3 a) Let $A = \{a, b, c, d\}$ and let $R = \{(a,b), (b,c), (c,d), (b,a)\}$. Find the Transitive Closure of R and R^∞ .

[05]

b) $A = \{1, 2, 3, 5, 6, 10, 15, 30\}$ and R be the relation "is divisible by" Obtain the relation matrix and draw the Hasse diagram.

[05]

c) Define Homomorphism, Auto Orphism with proper example

[05]

d) Let $A = \{1, 2, 3, 4\}$ and

$$R = \{(1,1), (2,2), (3,3), (4,4), (2,1), (1,2), (2,3), (3,2), (3,1), (1,3)\}$$

Prove that R is an equivalence relation. Also find its matrix.

[05]

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Q: 4 a) Consider a set of integer Z . Let aRb if $b=a^r$ for some positive integer r .

Show that R is a partial order relation.

[05]

b) Let $A = \{1, 2, 3, 4\}$ and let $R = \{(1, 2), (2, 3), (3, 4), (2, 1)\}$

Find Transitive closure of R using wars hall's algorithms.

[05]

c) Find the reflexive closure and symmetric closure of each of the following relation defined on $A = \{a, b, c\}$ $R = \{(a, b), (b, b), (b, c), (c, a)\}$

[05]

d) Let $A = \{a, b\}$ which of the following table in fig, define a semi group on A ?

Which define a monoid on A .

[05]

A] *	a	b
a	a	b
b	a	a

[B] *	a	b
a	a	b
b	b	b

Q: 5 a) Let $S = \{a, b, c\}$ and $A = P(S)$. Draw the Hasse diagram of the poset A with the relation \subseteq (set inclusion).

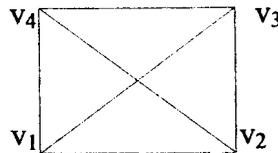
[05]

b) Let $f(x) = 3x+1$ and $g(x) = x-1/3$ where $f: R \rightarrow R$ and $g: R \rightarrow R$. Prove that $g = f^{-1}$.

[05]

c) State whether the adjoining graph is Eulerian. Give reasons.

[05]



d) Let $A = \{1, 2, 3, 5, 6, 10, 15, 30\}$ and R be the relation "is divisible by". Obtain the relation matrix and draw the Hasse diagram.

[05]

Q: 6 a) Consider the set $A = \{1, 2, 3, 4, 5, 6\}$ under the multiplication mod 7.

[10]

1) Find the inverses of 2,3,5,6

2) Prove that it is a cyclic group

3) Find the order and sub group generated by $\{3, 4\}$ and $\{2, 3\}$

4) Is G is cyclic.

b) Let $H = \begin{bmatrix} 1 & 1 \\ 1 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$ be a parity check matrix. Decode the following words relative to

Maximum likelihood decoding function (i) 0101 (ii) 1010 (iii) 1100

[10]

Q: 7 a) Let $A = \{0, 1, 2, 3, 4, 5\}$. Find the table for addition and multiplication modulo 6. Verify whether it is an integral domain.

[10]

b) Let G be a set of all square matrices of type $\begin{bmatrix} 1 & m \\ 0 & 1 \end{bmatrix}$ where $m \in Z$. Prove that G is

group under multiplication. Is it an abelian group?

[10]