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322351(14)

B. E. (Third Semester) Examination, April-May 2020/

NOV-DEC 2020

(New Scheme)

(CSE Engg. Branch)

MATHEMATICS-III

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of each question is compulsory. Attempt any* ***two*** *part from (b), (c) and (d) of each question.*

1. (a) Define Fourier Series and write Euler's formula for Fourier series. 2

(b) Prove that

$$x^2 = \frac{\pi^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2} \quad , \quad -\pi < x < \pi .$$

Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots = \frac{\pi^2}{12}. \qquad 7$$

(c) Obtain a half range cosine series for

$$f(x) = \begin{cases} Kx & , \quad 0 \le x \le l/2 \\ K(l-x) & , \quad l/2 \le x \le l \end{cases} \qquad 7$$

and deduce the sum of the series

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots\infty \qquad 7$$

(d) The following table give variations of periodic current over a period :

t (sec) :	0	$T/6$	$T/3$	$T/2$	$2T/3$	$5T/6$	T
A (amp) :	1·98	1·30	1·05	1·30	–0·88	–0·25	1·98

Show that there is a direct current part of 0·75 amp in the variable current and obtain the amplitude of the first harmonic. 7

2. (a) Write down an expression for the Laplace transforms of periodic function $f(t)$ with period T. 2

(b) Find the Laplace transform of : 7

(i) $f(t) = \dfrac{e^{-at} - e^{-bt}}{t}$

(ii) $f(t) = |t-1| + |t+1|, \; t \ge 0$

(c) Use convolution theorem to evaluate :

$$L^{-1}\left[\frac{S^2}{(S^2+a^2)(S^2+b^2)}\right] \qquad 7$$

(d) Solve

$$\frac{d^2x}{dt^2} + 9x = \cos 2t,$$

if $x(0) = 1, x(\pi/2) = -1$. 7

3. (a) State Cauchy's Residue theorem. 2

(b) If $f(z)$ is a regular function of z, prove that :

$$\nabla^2 |f(z)|^2 = 4|f'(z)|^2. \qquad 7$$

(c) Find the Laurent'z series expansion of

$$f(z) = \frac{7z-2}{(z+1)\,z\,(z-2)}$$

in the region $|<z+1<3|$. 7

(d) Apply calculus of Residues to prove that :

$$\int_0^{2\pi} \frac{d\theta}{1-2p\sin\theta+p^2} = \frac{2\pi}{1-p^2} \quad (0<p<1) \qquad 7$$

4. (a) From the partial differential equation by eliminating the arbitrary functions from

$$z = f(x+at)+g(x-at) \qquad 2$$

(b) Solve $(mz-ny)\frac{\partial z}{\partial x}+(nx-lz)\frac{\partial z}{\partial x} = ly-mx$. 7

(c) Solve

$$\left(D^2-DD'-2D'^2\right)z = (y-1)e^x \qquad 7$$

(d) Using the method of separation of variables, solve :

$$\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t}+u, \text{ given that } u(x,0)=6e^{-3x} \qquad 7$$

5. (a) Define Probability Density Function. 2

(b) The probability Density $p(x)$ of a continuous random variable is given by

$$p(x) = y_0\, e^{-|x|}, \quad -\infty<x<\infty$$

Prove that $y_0 = \frac{1}{2}$. Find Mean and Variance. 7

(c) The probability that a pen manufactured by a company will be defective is 1/10. If 12 such pens are manufactured, find the probability that

(i) exactly two will be defective

(ii) at least two will be defective

(iii) none will be defective 7

(d) Fit a Poission distribution to the set of observations :

x :	0	1	2	3
f :	122	60	15	2

7

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B022312(022)

B.Tech. (Third Semester) Examination

Nov.-Dec. 2020

(CSE Branch)

DATA STRUCTURE & ALGORITHMS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) is compulsory & Attempt any two parts from (b), (c) and (d) of each questions.*

Unit-I

1. (a) Explain asymptotic notations & also explain Big o notation & check whether this relation is valid or not with explanation $f\left(n_1 = 3x^2 + 4n = o\left(n^2\right)\right)$. 4

(b) Consider the linear array A [5 : 50], b [–5 : 10] & c [18].

(i) Find the number of elements in each array.

(ii) Suppose base (A) = 300 & w = 4 byte for A. Find the address of A [15], A [40] & A [55]. 8

(c) What is the ways to insert a node in link list? Write an algorithm for inserting a node at first position. 8

(d) Write an algorithm to delete the last node from a circular link list. 8

Unit-II

2. (a) Evaluate the given postfix expression : 4

9, 3, 4, *, 8, +, 4, /, –

(b) Write an algorithm to convert the infix to postfix expression & write all the steps involved in evaluating the postfix expression. 8

a+b*(c-d)/e+f % g

(c) Write an algorithm to traverse the circular queue. 8

(d) Write an algorithm for Tower of Hanoi & give example for n=3 disk. 8

Unit-III

3. (a) Write short notes on : 4

(i) Full Binary Tree

(ii) Complete Binary Tree

(b) Convert the following list into AVL Tree : 8

64, 1, 44, 26, 13, 110, 98, 85

(c) Convert the following list into B Tree of order = 5 : 8

10,25,15,4,3,5,9,2,7,11,12,50,26,23,22,13,24,6,8

(d) Short the following list by using Heap short algorithm : 8

10, 20, 50, 30, 15, 55, 25, 65, 45

Unit-IV

4. (a) Write short notes on the following : 4

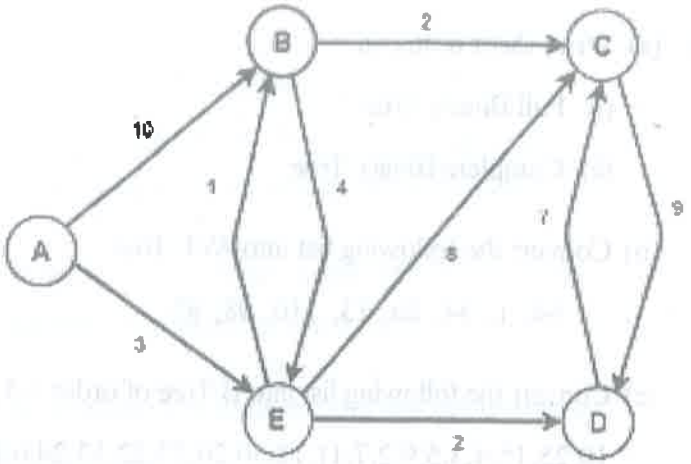
(i) Directed graph

(ii) Adjacency matrix

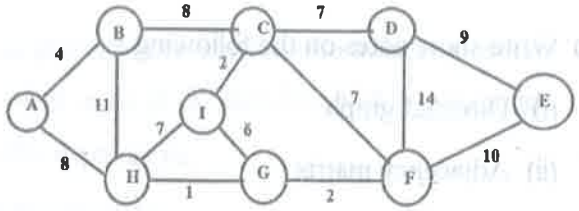
(iii) Degree or graph

(iv) Complete graph

(b) Find the shortest path from vertex A to all the vertex in the given graph by using Djkstra algorithm. 8



(c) By using Prims algorithm find spanning tree from the following graph : 8



(d) Distinguish between Breadth First Search and Depth First Search. 8

Unit-V

5. (a) Explain various types of time complexity and write down time complexity for Linear and Binary search. 4

(b) Consider inserting the key - 29, 46, 18, 36, 43, 21, 24, 54 into hash table of size ('M'=11) using linear probing consider the primary hash ( ) is H(k)=k (Mod m). 8

(c) Search the item 80 from the following list using binary search 8

11,22,30,35,42,45,53,63,65,78,80,90,95

(d) Sort the following series by using selection sort and write time complexity for selection sort. 8

32,51,27,85,66,23,13,57

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B022313(022)

B.Tech. (Third Semester) Examination
Nov.-Dec. 2020

(AICTE Scheme)

(Computer Science and Engg. Branch)

PRINCIPLES of PROGRAMMING LANGUAGES

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) is of 4 marks and Part (b), (c) and (d) are of 8 marks. Part (a) is compulsory and attempt any* ***two*** *parts from (b), (c) and (d). Assume any missing data. Use diagrams wherever required.*

1. (a) True / False?

(i) Full form of DFD is Data Flow Diagram.

(ii) The flowchart depicts flow of control in program modules.

(iii) We should try to minimize coupling.

(iv) We should try to maximize cohesion.

(b) Explain :

(i) Operational Acceptance Testing

(ii) Alpha Testing

(iii) Beta Testing

(iv) Software Maintenance phase

(c) Explain following points about DFD :

(i) Definition, purpose and symbols used.

(ii) Purpose of Level-0 and Level-1 DFD

(d) Explain about :

(i) Abstraction

(ii) Refinement

(iii) Modularity

(iv) Software Architecture

2. (a) True / False?

(i) Relative address is a memory address that represents some distance from a starting point or the base address.

(ii) The variable names, constants and instruction labels are the basic elements of the symbolic address space.

(iii) In late binding the calling of the function gets bound with the definition of the function at compile time.

(iv) In early binding the binding of the function call to the respective definition during runtime.

(b) Answer the following :

(i) What is the need of Assembler?

(ii) Compare Compiler and Interpreter.

(c) Answer the following :

(i) Draw that diagram of Water fall model and Prototyping model.

(ii) Compare Water fall model and Prototyping model.

(d) Answer the following :

(i) Draw the Scrum Development Model.

(ii) Explain the components of Scrum Development Model.

3. (a) True / False?

(i) Java is an example of Imperative programming language.

(ii) Java is an example of Functional programming language.

(iii) LISP is an example of Imperative programming language.

(iv) LISP is an example of Functional programming language.

(b) Answer the following :

(i) Explain Imperative programming

(ii) Explain Functional programming

(c) Explain following about LISP :

(i) Executor

(ii) Atoms

(iii) Lists

(iv) Strings

(d) Explain following about PROLOG :

(i) Variable and Atom

(ii) Clause or rule

4. (a) True / False?

(i) C++ is an object oriented programming language.

(ii) C++ is a procedural programming language.

(iii) Objects are created using class.

(iv) Objects are created using functions.

(b) Answer the following :

(i) What are Static members in a class?

(ii) Write a program in C++ to demonstrate the use of static members in a class.

(c) Answer the following :

(i) What are Nested class?

(ii) Write a program to demonstrate the use of Nested class.

(d) Answer the following :

(i) Compare New and Delete operators.

(ii) Write a program in C++ to demonstrate the use of New and Delete operators.

5. (a) True / False?

(i) Try-Catch are part of exception handling in C++.

(ii) Throw-Try-Catch are part of exception handling in C++.

(iii) During inheritance un-named instance of child class in gets created in parent class instance.

(iv) Templates implement runtime polymorphism.

(b) Answer the following :

(i) Explain function templates with code example in C++.

(ii) Explain class templates with code example in C++.

(c) Answer the following :

(i) Explain Abstract class in C++.

(ii) Write a program to create an Abstract class in C++.

(d) Answer the following :

(i) Explain Hybrid inheritance in C++.

(ii) Write a program in C++ to demonstrate Hybrid inheritance.

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B022314(022)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2020

(Computer Science and Engg. Branch)

DIGITAL ELECTRONICS and LOGIC DESIGN

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note *: Attempt all questions. Each question carries equal makrs. Part (a) is compulsory and answer any* ***two*** *parts from (b), (c) and (d).*

1. (a) Fill in the blanks : 4

(i) (84-2-1) code for decimal digit 3 is .....

(ii) 2's complement of 101100 is .....

(iii) Binary of gray code 00110110 is .....

(iv) Excess 3 code of decimal number 9 is .....

(b) Solve the following using K-map : 8

(i) $F1(A, B, C, D) = \Sigma m(1, 5, 6, 12, 13, 14) + \Sigma d(24)$

(ii) $F2(A, B, C, D) = \Pi m(0, 1, 2, 4, 6, 8, 9, 11, 12)$

(c) Simplify the following using Tabulation method : 8

$F(A, B, C, D) = \Sigma m(1, 3, 5, 8, 9, 11, 15) + d(2, 13)$

(d) The message below coded in the 7-bit hamming code is transmitted through channel. Decode the message assuming that single error occurred in each code word.

(i) 1001001

(ii) 0111001

(iii) 1110110

(iv) 0011011

Find the correct code in each case. 8

2. (a) Compare RTL, DTL, TTL and ECL on the basis of : 4

(i) Component used

(ii) Fan out

(iii) Propagation delay and

(iv) Application

(b) With the help of neat diagram, explain the working of :

(i) CMOS inverter and

(ii) CMOS NOR gate 8

(c) Explain the working of TTL circuit with Totem pole output configuration. 8

(d) Implement the fgollowing Boolean function using : 8

(i) PLA

(ii) PLA

$F1(A, B, C) = \Sigma m(3, 4, 5, 6, 7)$

$F2(A, B, C) = \Sigma m(2, 5, 6, 7)$

3. (a) Fill in the blanks : 4

(i) ..... consists of logic gates where output at any instant is determined by present combination of input as well as previous state of output.

(ii) ..... is an example of combinational circuit.

(iii) Logical expression of carry out in half adder is .....

(iv) Minimum number of NAND gates required for designing Half Adder is .....

(b) Design 4-bit look ahead carry adder with suitable diagram. 8

(c) Design full adder using 4 : 1 MUX. 8

(d) Design and implement comparator. 8

4. (a) Convert SR flip-flop to T flip-flop. 4

(b) What is race around condition for J-K flip-flop? How it can be avoided in master slave flip-flop? 8

(c) Design and implement 4 bit synchronous up counter. 8

(d) Design Serial in Serial Out (SISO) and parallel in Serial Out (PISO) shift register using D flip-flop. 8

5. (a) Discuss the various operators used in VHDL. 4

(b) Write short notes on Mealy and Moore machine. 8

(c) Write a program in VHDL using data flow modelling for half adder. 8

(d) Write a program in VHDL using behavioural modelling for AND gate. 8

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B022315(022)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2020

(CSE Branch)

(Specialization : CSE)

OPERATING SYSTEMS

Time Allowed : Three hours

Maximum Marks : 100

Note : *Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d).*

Unit-I

1. (a) Explain how operating system acts as a Resource Manager? 4

(b) The services and functions provided by an operating

system can be divided into different components. Briefly explain all the components of Operating System. 8

(c) Analyze different types of operating systems with an example. Which type of operating system is most suitable for the modern computer system and why? 8

(d) Name and discuss the range of system calls that may be supplied by an operating system under various circumstances. List the sequence of system call required to copy content of a file to another file. 8

Unit-II

2. (a) Give Five State model of process state transition. 4

(b) What are the two models of inter-proces communication? What are the strengths and weakeness of the two approaches? 8

(c) Discuss critical section problem and how this can be overcome using semaphores. Write the solution for achieving mutual exclusion requirement in a producer consumer problem. 8

(d) What is CPU scheduling? If the different jobs and their arrival time and burst time are given below :

P. No.	Arrival time	Burst time
1	0	6
2	1	4
3	2	3
4	3	1
5	4	2
6	5	1

Find the average turnaround time, average waiting time and throughput using Round Robin (with time quantum = 2) and SRTF. 8

Unit-III

3. (a) What is Deadlock? Give characteristics of deadlock. 4

(b) What are the four necessary conditions for characterizing deadlock? What is the only reasonable condition that can be used to prevent deadlocks from occurring? 8

(c) Explain Banker's algorithm and safety algorithm with pseudo code. 8

(d) Write an algorithm to determine whether a given system is in a deadlock and explain. Consider resource A has total 7 instances, B has 2 instances and C has 6 instances the following snapshot of a system :

Process	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	0	0	0	0	0	0
P_1	2	0	0	2	0	2			
P_2	3	0	3	0	0	0			
P_3	2	1	1	1	0	0			
P_4	0	0	2	0	0	2			

Answer the following using Banker's algorithm :

(i) Is the system in a safe state?

(ii) If Yes, mention the safe sequence.

(iii) If a process P2 makes a request of one additional request for an instance of type C, will the system lead to deadlock state then. 8

Unit-IV

4. (a) What is virtual memory? 4

(b) What is the need of page replacement? Consider the following page references string :

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

Find out the no. of page fault by LRU, OPT replacement, FIFO algorithm. Assume there are four page frames. 8

(c) Explain the difference between internal and external fragmentation :

Given five variable sized memory partitions of 100 kb, 500 kb, 200 kb, 300 kb, 600 kb (in order), how would each of the first fit, best fit and worst fit algorithm place processes of 212 kb, 417 kb, 112 kb and 426 kb (in order)? Which algorithm makes most efficient use of memory? 8

(d) Why are segmentation and paging sometimes combined into one scheme? Explain the paged segmentation. 8

Unit-V

5. (a) What are the different files allocation methods? 4

(b) Considering SCAN disk scheduling algorithm. How

is it possible to reduce the time required to finish off? Explain with an example. 8

(c) Describe various file accessing methods with its advantages and disadvantages. 8

(d) Suppose that the head of a moving head disk with 200 tracks, 0 to 199, is currently serving a request at 143 and has just finished a request at track 125. The queue of request is kept in FIFO order 86, 147, 91, 177, 94 150, 102, 175, 130. What is the total number of head movement needed to specify these request for the following disk scheduling algorithms?

(i) SSTF scheduling

(ii) SCAN scheduling 8

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B028314(028)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2020

(AICTE Scheme)

NETWORK THEORY

(Electronics & Telecommunication Engg. Branch)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) carries 4 marks and is compulsory. Attempt any two parts from part (b), (c) and (d) carrying 8 marks each.*

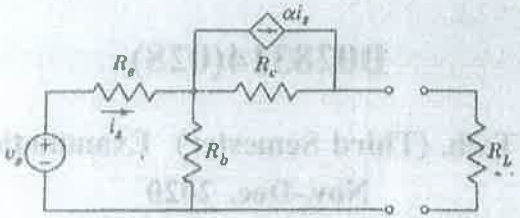
Unit-I

1. (a) (i) State Maximum Power Transfer Theorem.

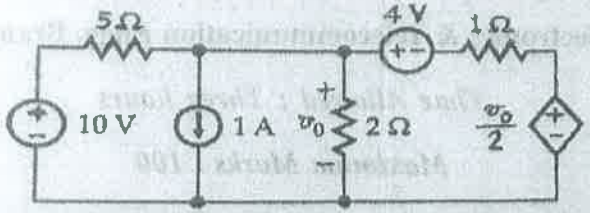
(ii) Define Average power and Complex power.

(b) The network shown in the figure below is a simple representation of a transistor. For this network,

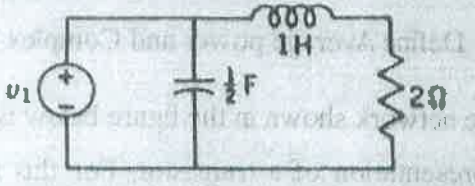
determine the Thevenin's equivalent network for the load R_L



(c) In the network of the figure shown below, find v_0 using Superposition theorem.



(d) The network of the figure is operated in the sinusoidal steady with the element values given and $v_1 = 100 \cos 2t$. Determine (a) the complex power generated by the source, (b) the effective current in each of the passive elements, and (c) the complex power for each of the passive elements in the network.

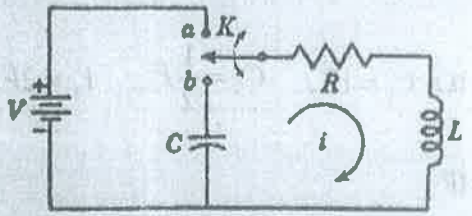


Unit-II

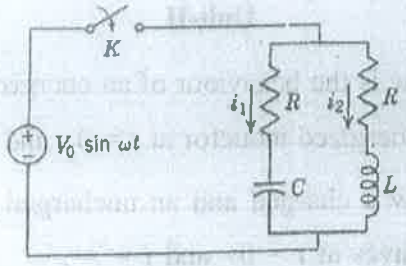
2. (a) (i) How is the behaviour of an energized and an unenergized inductor at $t = 0+$ and $t = \infty$.

(ii) How a charged and an uncharged capacitor behaves at $t = 0+$ and $t = \infty$.

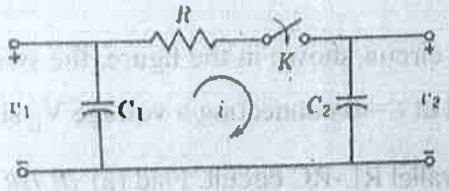
(b) In the network of the figure, switch K is changed from position a to b at $t = 0$. Solve for i di/dt and d_2i/dt_2 at $t = 0+$ if $R = 1000\ \Omega$, $L = 1H$, $C = 0.1$ μF and $V = 1000$ V.



(c) In the circuit shown in the figure, the switch K is closed at $t = 0$ connecting a voltage $V_0 \sin \omega t$, to the parallel RL-RC circuit. Find (a) di_1/dt and (b) di_2/dt at $t = 0+$.



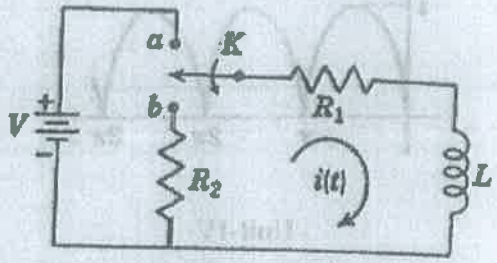
(d) In the network given, the initial voltage on C_1 is V_1 and on C_2 is V_2 such that $v_1(0) = V_1$ and $v_2(0) = V_2$. At $t = 0$, the switch is closed, determine the values of dv_1/dt and dv_2/dt at $t = 0+$. If $R_1 = 1\Omega$, $C_1 = 1F$, $C_2 = \frac{1}{2}F$, $V_1 = 2V$ and $V_2 = 1V$.



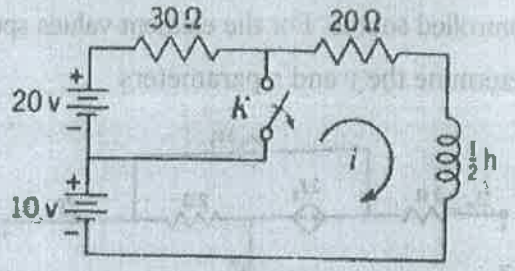
Unit-III

3. (a) State and prove Time Shifting Theorem.

(b) In the network of the figure, the switch K is moved from position a to position b at $t = 0$, a steady state having previously been established at position a. Solve for current $i(t)$, using the Laplace transformation method.



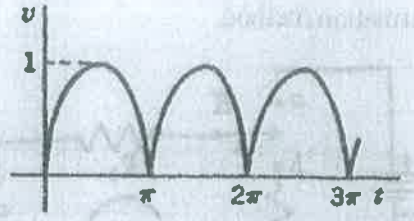
(c) The network of the figure reaches a steady state with the switch K open. At $t = 0$, switch K is closed. Find $i(t)$ using the numerical values given, using the Laplace transformation method.



(d) The waveform shown in the figure is that of a full-

wave rectified voltage. The equation for the waveform is $\sin t$ from 0 to π, $-\sin t$ from π to 2π, etc. Show that the transform of this function is :

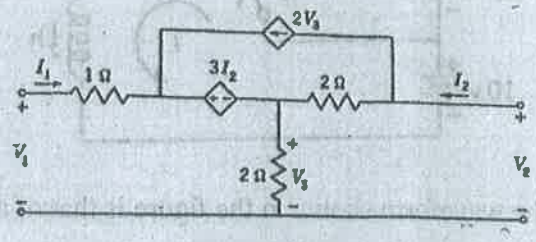
$$F(s) = \frac{1}{s^2+1} \coth \frac{\pi s}{2}$$



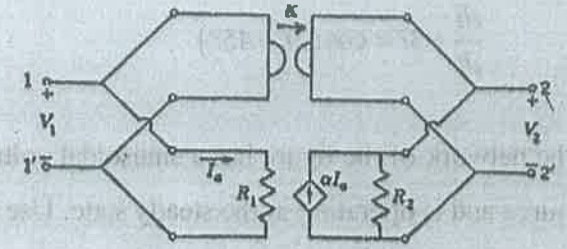
Unit-IV

4. (a) Why h-parameters are called hybrid parameters? Write the application of h-parameters?

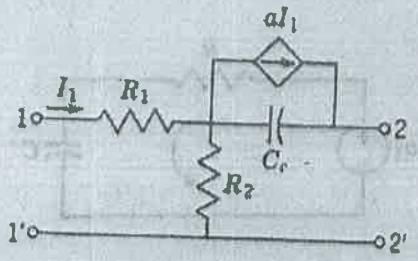
   (b) Why the z-parameters are called open circuit impedance parameters? The network shown below contains a voltage controlled source and a current controlled source. For the element values specified, determine the y and z parameters.



   (c) The accompanying figure shows two two-port networks connected in parallel. One two-port contains only a gyrator and the other is a resistive network containing a single controlled source. For this network, determine the y-parameters.



   (d) The network of the figure represents a certain transistor over a given range of frequencies. For this network, determine the h parameters.



Unit-V

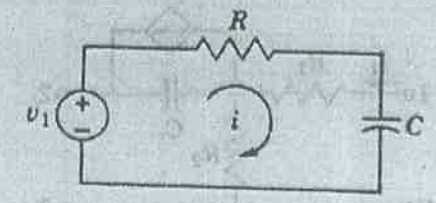
5. (a) Define Sinusoid. What is the relation between

Sinusoid and $e^{\pm j\omega t}$?

(b) Using the method of solution using $e^{\pm j\omega t}$, solve the following differential-equation for the steady-state solution.

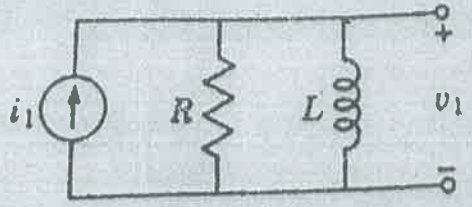
$$\frac{di}{dt} + 3i = \cos(2t + 45°)$$

(c) The network of the figure has a sinusoidal voltage source and is operating in the steady state. Use the method of determining the response due to $e^{\pm j\omega t}$, determine the steady-state current $i(t)$ if $v_1 = 2\cos 2t$.



(d) In the network of the figure shown below $i_1 = 3\cos(t + 45°)$ and the network is operating in

the steady state. Using the method of determining the response due to $e^{\pm j\omega t}$, determine the node to datum voltage $v_1(t)$.



Printed Pages – 3 Roll No. : .....

B033313(033)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2020

(New Scheme)

OBJECT ORIENTED CONCEPTS & PROGRAMMING USING JAVA

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all the questions. Part (a) is compulsory from each unit and carries 4 marks. Attempt any* ***two*** *parts from (b), (c) and (d). Each part carries 8 marks.*

Unit-I

1. (a) What do you mean by class and object?

(b) What are the features of OOP's in Java?

(c) Explain command line argument with suitable code.

(d) Explain 'this' keyword with suitable program.

Unit-II

2. (a) What is packages in Java?

(b) What is abstract classes in Java?

(c) What is 'Final' keyword? Explain is uses.

(d) What is methods overriding? Explain with program.

Unit-III

3. (a) What do you mean by exception?

(b) How we can handle an exception in Java?

(c) What is user defined exception? Write a suitable code.

(d) What are the different string handling method in Java?

Unit-IV

4. (a) What is thread priority?

(b) What do you mean by thread synchronization?

(c) How we can create a thread?

(d) Explain life cycle of thread.

Unit-V

5. (a) What is AWT?

(b) Explain life cycle of applet.

(c) What are the JDBC drivers?

(d) What are the basic steps to connect Java application with database.

Printed Pages – 4 Roll No. : .....

B033314(033)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2020

(New Scheme)

COMPUTER NETWORKS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *All questions are compulsory. Part (a) is compulsory from each unit and carries 4 marks. Attempt any* ***two*** *parts from (b), (c) and (d). Each part carries 8 marks.*

Unit-I

1. (a) What are the applications of Computer Networks?

(b) Define computer networks? Discuss various types of networks topologies in computer network. Also

discuss various advantages and disadvantages of each topology.

(c) What is OSI Model? Explain the functions, protocols and serivces of each layer.

(d) Explain the following transmission media. Twisted pair, coaxial cable and fiber optics.

Unit-II

2. (a) What is Multiplexing?

(b) Discuss about physical properties of Ethernet 802.3 with necessary diagram of Ethernet transceiver.

(c) Explain different error detection and correction mechanisms with examples.

(d) Explain CSMA/CD and protocols with collision detection and Avoidance.

Unit-III

3. (a) Define Masking.

(b) Explain :

(i) Repeater

(ii) Bridge

(iii) Router

(iv) Gateway

(c) What is IP addressing method and write the difference between IPv4 and IPv6.

(d) Write short notes on :

(i) Distance vector routing

(ii) Link state routing

Unit-IV

4. (a) What is segmentation?

(b) Write the difference between UDP & TCP protocols.

(c) What is the function of X·25? Explain in detail.

(d) Write short notes on ATM?

Unit-V

5. (a) What is Cryptography?

(b) What is network security explain in detail.

(c) What is meant by cryptography explain with the help of suitable examples.

(d) Explain detail about Domain Name System