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3E1102**3E1102****B. Tech. III - Sem. (Main) Exam., Dec. - 2018****HSMC****3AN1 – 02 Technical Communication CS/IT/EC****All branches****Time: 2 Hours****Maximum Marks: 80***Instructions to Candidates:**Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.**Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.**Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[5×2=10]****All questions are compulsory**

- Q.1 Define technical communication. [2]
- Q.2 What are technical manuals? [2]
- Q.3 What is a strategy for effective writing? [2]
- Q.4 Why is a meeting agenda important for a productive meeting? [2]
- Q.5 Describe what is a technical project proposal. [2]

PART – B**(Analytical/Problem solving questions)****[4×10=40]****Attempt any four questions**

- Q.1 Describe technical communication skills (Listening speaking, writing and reading) and their importance for engineers. [10]
- Q.2 Describe strategies for organization of information and information design. [10]
- Q.3 Explain methods to improve vocabulary and linguistic abilities. [10]
- Q.4 Find the error and rewrite the sentence correctly- [10]
- (1) We all swim at the beach yesterday.
 - (2) They hadn't scarcely enough feed for their cattle.
 - (3) The animals has damaged my plants.
 - (4) The perfume is for your sister and yourself.
 - (5) My father has been sleep all day.
 - (6) Mother has cook new dishes.
 - (7) Not only Ram but only Sham is my friend.
 - (8) A bus runs passed our house.
 - (9) Neither Peter or James can sing well.
 - (10) He drove fast so he might arrive early.
- Q.5 Describe the technical writing process in detail. [10]
- Q.6 Discuss the types, structure and writing formats of technical articles. [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [2×15=30]

Attempt any two questions

Q.1 You are Anand / Arti of 18 Model Town, New Delhi. You have seen an advertisement in the Hindu for the post of Engineer in an MNC. Apply for the job with complete resume. [7.5+7.5=15]

Q.2 Describe Technical reports, mentioning types and characteristics of technical reports in detail. [5+5+5=15]

Q.3 Make notes on the contents of the passage given below, giving a suitable title. Make a summary of the passage. [7.5+7.5=15]

You need excellent verbal and written communication skills. Depending on the industry in which you work, the purpose of your content and the people who are using it, you may produce a lot written (text – based) documentation or focus more on images, simulations, videos and flowcharts. Regardless of the type of output, you need to be able to question subject matter experts (SMEs). You also need to be able to distil what SMEs tell you into information at an appropriate level of complexity (both in terms of level of content and language) for the people needing to use it.

The amount of subject matter knowledge you need as a technical communicator varies greatly depending on both the industry and the intended audience. For example, if you are communicating about consumer products for consumers, you are probably in a good position to understand what they need. In contrast, if you are writing for people working

in the pharmaceutical, nuclear or software development industries, you may need some specialist knowledge of the appropriate area so you can pitch your communication at an appropriate level. Technical communicators use a number of software applications to do their work. While no – one can know every application in depth, a general understanding of the types of application out there and what they are used for is useful. Detailed knowledge tends to grow as you use an application, and you can also attend tool – specific training courses or (in many cases) download trial versions to play.

The sort of person who tends to make a good technical communicator is one who has an eye for detail but is also able to see the bigger picture. He or she will be curious – about how something works, how to use it, how to use it more effectively or more efficiently. Being able to see things from someone else’s perspective is good – what is important to them, why are they doing what they are doing, what do they need to know. Finally, tenacity. You may have questions, and you need to keep asking them until you get an answer you can use. You may not understand all of the answer, but enough to be sure that it will make sense to those who should.

3E1136

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B. Tech. III - Sem. (Main) Exam., Dec. - 2018
BSC Computer Science & Engineering
3CS2 – 01 Advanced Engineering Mathematics
CS, IT

Time: 3 Hours**Maximum Marks: 120***Instructions to Candidates:*

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**Q.1 The probability density function of the random variable x is given by

$$f(x) = \begin{cases} \frac{K}{\sqrt{x}}, & \text{for } 0 < x < y \\ 0, & \text{elsewhere} \end{cases} \quad \text{find the value of K.} \quad [2]$$

Q.2 Out of 800 families with four children each, how many families would be expected to have at least one boy? Assume equal probability for boys and girls. [2]

Q.3 Find the correlation coefficient between x and y when it is given that. [2]

$$n = 15, \Sigma x = 50, \Sigma y = -30, \Sigma x^2 = 290, \Sigma y^2 = 300, \Sigma xy = -115$$

Q.4 Define Binomial distribution. [2]

Q.5 Write short note on History of optimization. [2]

Q.6 Determine the maximum and minimum values of the function [2]

$$f(x) = x^5 - 5x^4 + 5x^3 - 1$$

Q.7 Determine the nature of the given matrix. [2]

$$A = \begin{bmatrix} -1 & -1 & -1 \\ -1 & -2 & -2 \\ -1 & -2 & -3 \end{bmatrix}$$

Q.8 An animal food company must produce 200 Kg of a mixture containing ingredients A_1 and A_2 daily. Ingredient A_1 costs ₹ 3.00 per kg and A_2 costs ₹ 8.00 per kg. Not more than 80 kg of A_1 can be used and at least 60 kg of A_2 must be used. Formulate the problem. [2]

Q.9 Write the dual of the given linear programming problem. [2]

$$\text{Max } z = x_1 + 2x_2 - x_3$$

$$\text{S. to } 2x_1 - 3x_2 + 4x_3 \leq 5$$

$$2x_1 - 2x_2 \leq 6$$

$$3x_1 - 3x_3 \geq 4$$

$$x_1, x_2, x_3 \geq 0$$

Q.10 Define the slack, surplus and artificial variables in linear programming problem. [2]

PART - B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

Q.1 The first four moment of a distribution about the value 5 of the variable are 2, 20, 40, and 50. Find the mean, variance, β_1 and β_2 . Comment upon the nature of distribution. [8]

Q.2 The joint probability mass junction of (x, y) is given by $p(x, y) = k(2x + 3y)$, $x = 0, 1, 2$; $y = 1, 2, 3$. Find - [8]

(a) K

(b) Marginal probability distribution of X.

(c) Marginal probability distribution of Y

(d) Conditional probability distribution of X given $y=1$.

Q.3 Of a large group of men 5% are under 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution find the mean height and standard deviation. [8]

Q.4 Define rectangular distribution and find its mean and variance. [8]

Q.5 Use Kuhn – Tucker conditions to [8]

$$\text{Min } f(x, y, z) = x^2 + y^2 + z^2 + 20x + 10y$$

$$\text{s.to (a) } x \geq 40$$

$$(b) \quad x + y \geq 80$$

$$(c) \quad x + y + z \geq 120$$

Q.6 Solve by simplex method. [8]

$$\text{Min } Z = x_1 - 3x_2 + 2x_3$$

$$\text{s:to } 3x_1 - x_2 + 3x_3 \leq 7$$

$$-2x_1 + 4x_2 \leq 12$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10$$

$$x_1, x_2, x_3 \geq 0$$

Q.7 Find the initial basic feasible solution of the given transportation problem. [8]

Warehouse → factory ↓	W ₁	W ₂	W ₃	W ₄	Factory Capacity
F ₁	19	30	50	10	7
F ₂	70	30	40	60	9
F ₃	40	8	70	20	18
Warehouse requirement	5	8	7	14	34

PART – C**(Descriptive/Analytical/Problem Solving/Design Questions)** [4×15=60]**Attempt any four questions**

Q.1 From a lot of 25 items containing 5 defectives, a sample of 4 items is drawn at random,
(i) without replacement (ii) with replacement.

Find the expected value of the number of defectives in the sample in each case. [15]

Q.2 Define Poisson distribution and find its mean and variance. [15]

Q.3 Write 12 applications of Optimization techniques in Engineering. [15]

Q.4 Find the extreme points of $u = 2x + y + 10$ subject to $g(x, y) = x + 2y^2 - 3 = 0$ [15]

Q.5 A certain equipment's needs five repair jobs, which have to be assigned to five mechanics. The estimated time (in hours) that each mechanic requires to do the repairs is given by the following table. [15]

Assuming that each mechanic can be assigned to only one Job, determine the minimum time assignment.

Jobs →	J ₁	J ₂	J ₃	J ₄	J ₅
M ₁	7	5	9	8	11
M ₂	9	12	7	11	10
M ₃	8	5	4	6	9
M ₄	7	3	6	9	5
M ₅	4	6	7	5	11

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B. Tech. III - Sem. (Main) Exam., Dec. - 2018
 ESC Computer Science & Engineering
 3CS3 – 04 Digital Electronics
 CS, IT

Time: 3 Hours

Maximum Marks: 120

Instructions to Candidates:

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

Q.1 Convert $(D2.9)_{16} = ()_8$

Q.2 Find the sum $(y)_6 = (5.2)_6 + (4.5)_6$

Q.3 Convert $Y = A + B\bar{C} + A\bar{B} + A\bar{B}C$ into canonical form.

Q.4 Find the minimum number of nand gate required to realize $Y = A\bar{B}C$.

Q.5 Find the value of x

$$(23)_x + (12)_x = (101)_x$$

- Q.6 Explain the reflected code.
- Q.7 Implement a latch using 2:1 mux.
- Q.8 State the difference between combinational and sequential circuit.
- Q.9 Write the RS flip flop excitation table.
- Q.10 How many JK flip flop are required to implement modulus 50 counters?

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 The two numbers represented in signed 2's complement form are P = 11101101 and Q = 11100110. Find the value obtained in signed 2's complement form for P – Q.
- Q.2 Simplify the following function and implement it using NOR gate –
- $$F = A\bar{B} + AB\bar{D} + A\bar{B}\bar{D} + \bar{A}\bar{C}\bar{D} + \bar{A}B\bar{C}$$
- Q.3 Implement the following logic using only one 8:1 MUX –
- $$F(A, B, C, D) = \sum m(1, 3, 4, 11, 12, 13, 14, 15)$$
- Q.4 Explain prime, essential and redundant implicant using suitable example.
- Q.5 State the merits and demerits of various logic families.
- Q.6 Convert JK flip flop into RS flip flop. Explain its process also.
- Q.7 A stair case light is controlled by two switches one at top of stairs and another at bottom of stairs. Realize the circuit using minimum number of NOR gate when lamp (L) glows.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 Using JK flip flop design a synchronous counter that counts in sequence –

000, 001, 110, 011, 010, 111, 101, 100, 000

Q.2 Simplify the following function using tabulation method and verify the result using

K-map

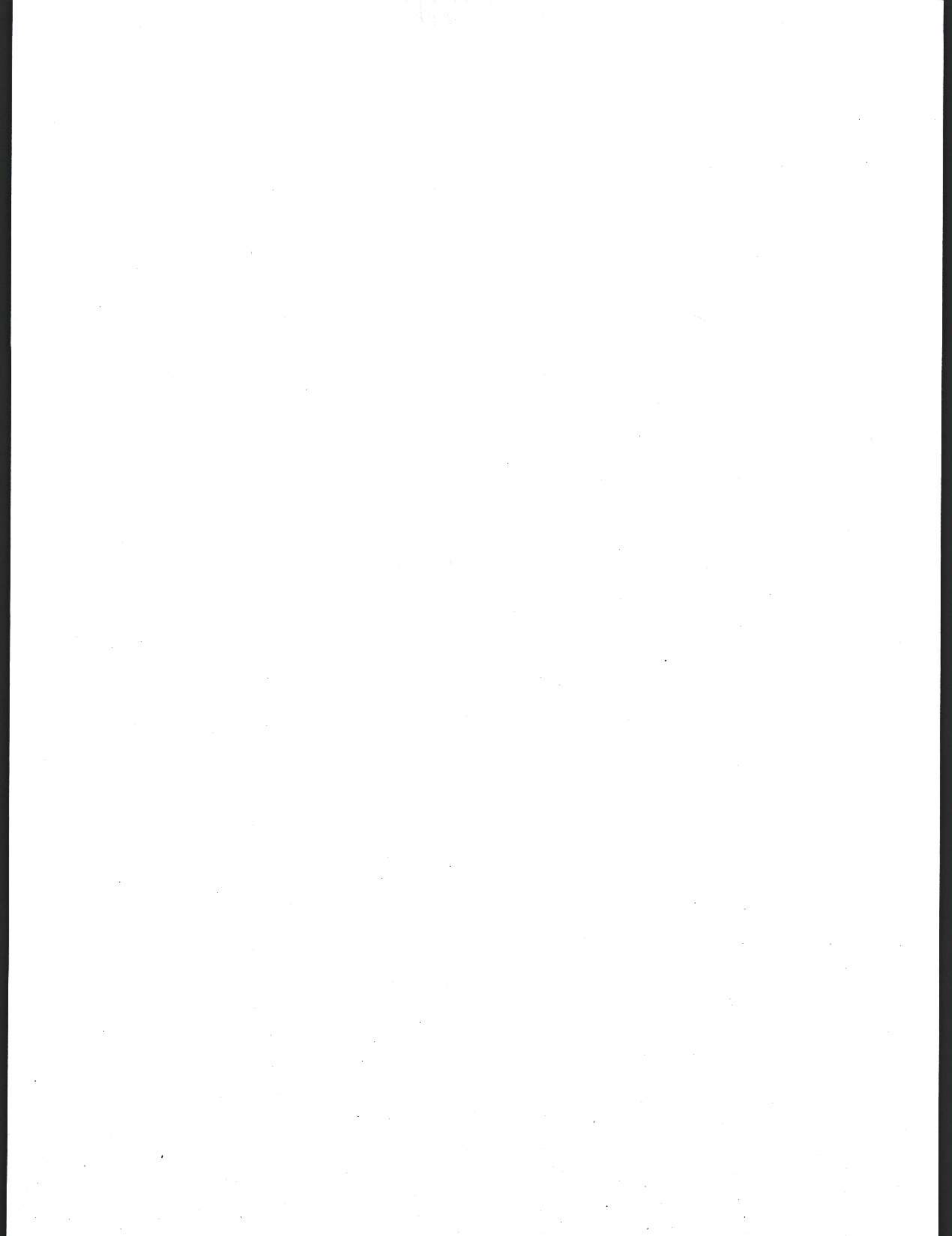
$$F = \sum (0, 6, 9, 10, 13) + d (1, 3, 8)$$

Q.3 Draw a neat circuit diagram of TTL (Transistor Transistor Logic) NAND gate with totem pole output and explain.

Q.4 Determine the next state for each of six unused states in BCD ripple counter. Is the counter self starting? Design a divide by 8 counter also.

Q.5 Write short note on only two –

- (a) Universal gate
 - (b) ASCII code
 - (c) Weighted code
 - (d) High threshold logic
-



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3E1138

B. Tech. III - Sem. (Main) Exam., Dec. - 2018
 PCC Computer Science & Engineering
 3CS4 – 05 Data Structures and Algorithms
 CS, IT

Time: 3 Hours

Maximum Marks: 120

Instructions to Candidates:

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

- Q.1 What are the applications of stack?
- Q.2 Write down the recursive algorithm to solve tower of Hanoi problem?
- Q.3 What are the differences between normal queue and circular queue?
- Q.4 Write down the advantages and disadvantages of singly linked list?
- Q.5 Write down the asymptotic upper bound of bubble sort, selection sort, quick sort and heap sort?

- Q.6 Write down the algorithm of binary search.
- Q.7 Write down the differences between B tree and B+ tree.
- Q.8 Write down the differences between BFS and DFS.
- Q.9 What do you mean by spanning tree?
- Q.10 Write short note on hash functions.

PART - B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 Translate infix expression into its equivalent postfix expression:
- (a) $(A - B) * (D/E)$
- (b) $(A + B \uparrow D) / (E - F) + G$
- Q.2 Write down the algorithm for insertion of a node in the middle of doubly linked list.
- Q.3 Sort the following elements using quick sorting algorithm.
- < 2, 10, 9, 6, 1, 15, 5, 11 >
- Q.4 A Binary tree T has 9 nodes, The in order and pre order traversal for T yield the following sequences of nodes:
- IN order: E A C K F H D B G
- Pre order: F A E K C D H G B
- Draw the tree T
- Q.5 What are the different AVL tree rotations? Explain with suitable example.
- Q.6 Write down the algorithm to important stack using linked list.
- Q.7 Suppose a binary tree T is in memory write a recursive procedure which finds the depth Dp of T.

PART – C**(Descriptive/Analytical/Problem Solving/Design Questions)** [4×15=60]**Attempt any four questions**

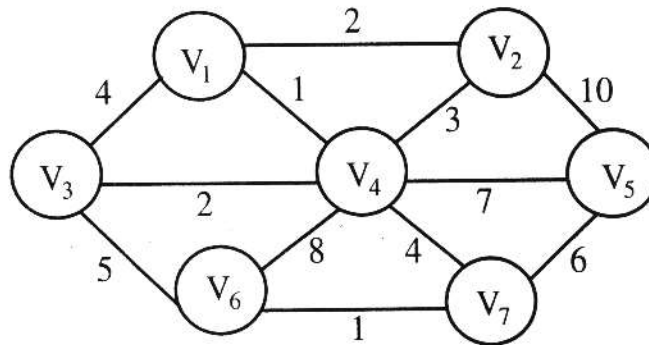
Q.1 Write a C program to perform following operations over singly linked list.

- (a) Create
- (b) Traversal
- (c) Insertion of node at user specified location

Q.2 Write down the algorithm of counting sorting and sort following elements using counting sorting.

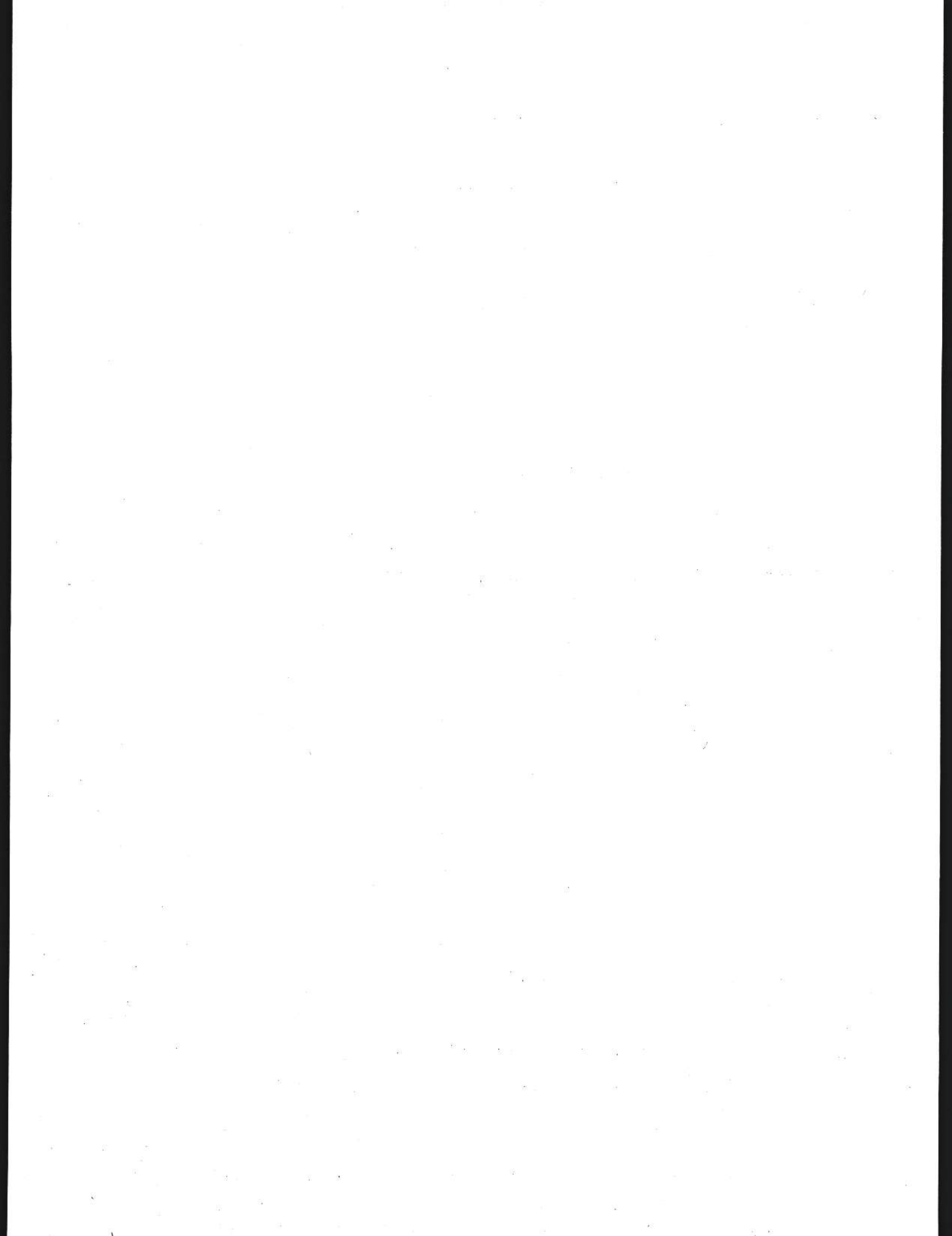
< 2, 1, 3, 9, 6, 1, 3, 9, 6, 5, 6, 8, 5, 3 >

Q.3 Obtain minimal spanning tree using prim's and Kruskal's algorithm on the following graph



Q.4 Write a C program to implement merge sorting.

Q.5 What do you mean by hash functions? Explain common hashing functions along with all address calculation techniques.



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B. Tech. III - Sem. (Main) Exam., Dec. - 2018
PCC Computer Science & Engineering
3CS4 – 06 Object Oriented Programming
CS, IT

Time: 3 Hours**Maximum Marks: 120***Instructions to Candidates:*

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 What is copy constructor? Explain with suitable example.
 Q.2 What is the purpose of using overloading operators?
 Q.3 What is the output of the program

```
#include<iostream.h>
void main()
{
  int n=1;
  cout<<endl<<"The numbers are;"<<endl;
  do
  {
    cout<<n<<"\t";
    n++;
  } while (n<=100);
  cout<<endl;
}
```

- Q.4 Name the operators which cannot overload. What is the significance of scope resolution operators (::)?
- Q.5 What are the differences between class and structure in terms of memory allocation?
- Q.6 What are the differences between member function of a class and friend function?
- Q.7 What is Run-Time Error, Logical Error and Syntax Error?
- Q.8 Write a C++ program to implement pure virtual function.
- Q.9 What is the role of public, private and protected access specifiers within the class?
- Q.10 Write a C++ program using function template to swap two values.

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 Write short notes on the following: [4×2=8]
- (a) Dynamic Binding
 - (b) Abstract Class
 - (c) New & delete
 - (d) Function Overriding
- Q.2 Design a class having the constructor and destructor functions that should display the number of objects being created or destroyed of class type. [8]
- Q.3 Write a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array (type int). In main (), exercise the function with arrays of type int, long, double, and char. [8]
- Q.4 Create a time class that includes integer member values for hours, minutes and seconds. Make a member function get_time() that gets a time value from the user, and a function put_time() that displays a time in 12:59:59 format. Add error checking to the get_time() function to minimize user mistakes. This function should request hours, minutes and seconds separately, and should check that the range should be in between 0 and 23, and minutes and seconds between 0 and 59. [8]

- Q.5 Write an inline function, factorial (int x), which returns the factorial of value x. Test the function by reading values from the keyboard. [8]
- Q.6 Use for loops to construct a program that displays a pyramid on the screen. The pyramid should look like this [8]
- ```

1
121
12321
1234321
123454321

```
- Q.7 What do you mean by Programming Paradigm? Describe the concept of message passing in Object Oriented Programming. [8]

### **PART – C**

**(Descriptive/Analytical/Problem Solving/Design Questions)** [4×15=60]

#### **Attempt any four questions**

- Q.1 Write a C++ program which will implement '=' binary operators. The overload class should contain one parameterized constructor to initialize default value to the member variable, and a display function to display value of member variables.
- Q.2 Write C++ Program for the following statements.
- (a) What do you mean by inheritance? Implement multilevel inheritance with suitable example.
  - (b) Write a C++ Program which will implement static function, friend function and member function of a class.
- Q.3 Create a Class named "student" that contains roll\_number, stu\_name and course\_name, father\_name, DOB as data member and Input\_student and display\_student as member functions. Create A derived class named "exam" from the class named "student" with publicly inherited mode. The derived class contains members as mark1, mark2, mark3 as marks of three subjects and input\_marks and display\_results as member functions. Create an array of object of the "exam" class and display the result of 10 students.

Q.4 Handle the following exceptions to input two integers from keyboard to perform division operation.

- (a) A try block to throw an exception when a wrong type of data is entered.
- (b) When division by zero occurs.

Write appropriate catch block to handle above exceptions which are thrown from "thrown block".

Q.5 Write a C++ program using file handling to perform the following operations.

- (a) A file named 'data.txt' contains number from 0 to 100. Open the 'data.txt' file in read mode.
- (b) Read data from 'data.txt' file.
- (c) If the number is odd, open a new file named 'odd.txt' and write the odd number into 'odd.txt' file.
- (d) If the number is even, open a new file named 'even.txt' and write the even number into 'even.txt' file.
- (e) Display the data of all the files.

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**B. Tech. III - Sem. (Main) Exam., Dec. - 2018**  
**PCC Computer Science & Engineering**  
**3CS4 – 07 Software Engineering**  
**CS, IT**

**Time: 3 Hours****Maximum Marks: 120***Instructions to Candidates:*

*Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 Define verification and validation.
- Q.2 Suggest a suitable life-cycle model for a software product which an organization has undertaken on behalf of a specific customer who is likely to change his requirements. Justify your answer.
- Q.3 Write the objective of software project planning.
- Q.4 Write any two major differences between LOC and FP estimation techniques.
- Q.5 List the requirement analysis tasks.
- Q.6 Why is accuracy important in data dictionary?
- Q.7 How are coupling and software portability related? Give an example.

- Q.8 What is a “Design Walk through”? Is it different from a “Design Inspection”?
- Q.9 “Can we have inheritance without polymorphism?” –Comment on it.
- Q.10 List object oriented design approaches.

### **PART – B**

**(Analytical/Problem solving questions)**

**[5×8=40]**

**Attempt any five questions**

- Q.1 Explain the waterfall model. Suggest reasons, why it is not a true reflection of the activities which are involved in software development. Boehm came up with an alternative. Briefly explain it.
- Q.2 Compute function point and estimate effort for a project with the following information domain characteristics. Assume complexity weight factor is average, the number of inputs = 24, outputs = 16, inquiries=22, files=4, and external interfaces = 2, complexity adjustments value are 4, 2, 0, 4, 3, 4, 5, 3, 5, 5, 4, 3, 5, 5 and productivity = 6.4 FP/PM.
- Q.3 List any three common types of risks that typical software might suffer from. Explain how you can identify the risks that your project is susceptible to, suppose you are the project manager of a large software development project. Point out the main steps you would follow to manage the risks in your project.
- Q.4 Explain the components of Software Requirement Specification (SRS). Write the IEEE recommended structure of SRS.
- Q.5 Draw Data Flow Diagram of Traffic Control System for all 3 levels: 0-level, 1-level and 2-level.
- Q.6 Explain different types of cohesion that a module must exhibit. How is it different from coupling?
- Q.7 What is UML? Explain how it is useful in object oriented modeling.

**PART - C**

**(Descriptive/Analytical/Problem Solving/Design Question)** [4×15=60]

**Attempt any four questions**

- Q.1 (a) Explain RAD model in detail. Draw suitable diagram to show its activities. [8]  
(b) Explain why programs that are developed using evolutionary development are likely to be difficult to maintain. [7]
- Q.2 (a) Write a note on resources required for software development. [7]  
(b) Consider s software project of full screen editor. The major components identified are: [8]  
(i) Screen Edit  
(ii) Command Language Interpreter  
(iii) File Input and Output  
(iv) Cursor Movement and  
(v) Screen Movement.

The sizes for these components are estimated to be 6K, 7K, 2K, 4K and 3K LOC.

Assume cost driver values as 1.0. Use intermediate COCOMO model to determine:

- (i) Final effort  
(ii) Efforts estimates for different phases  
(iii) Total time  
(iv) Time estimates for different phases
- Q.3 (a) What is structured analysis? Explain control flow diagram and control process specification by giving a suitable example. [8]  
(b) Describe software prototyping in detail. [7]

Q.4 (a) Explain the following concepts with examples: Modularity, Stepwise Refinement and Information Hiding. [8]

(b) Describe the role of data and architectural designs in software design. How is flowchart different from box diagram in procedural design? Explain. [7]

Q.5 (a) Write similarities and dissimilarities between object oriented and functional oriented design approaches. [5]

(b) Perform Object-Oriented Analysis and design for the following problem: [10]

A factory has machines that fails uniformly after continuous operation and needs frequent adjustments and repair after a certain Mean Time To Failure (MTTF). A manager has certain number of adjusters who keep the machines running. The manager maintains a queue of operative machines and idle adjusters. If machines are waiting to be repaired, then the manager assigns the first queued machine to the next available adjuster. The factory administrator wants to get maximum possible output from its machines and adjusters. The objective of the simulation is to see how average machine and adjuster utilization depends on:

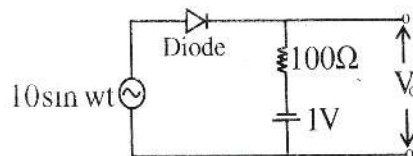
- Number of Machines
- Number of Adjusters
- Reliability of Machines in terms of MTTF
- Productivity of Adjusters



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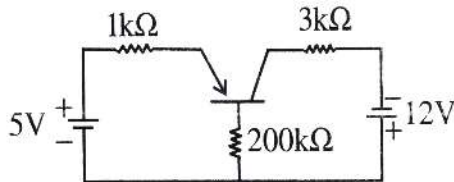
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3E1651

**3E1651****B Tech. III - Sem. (Main/Back) Exam., Dec. - 2018****Computer Science & Engineering  
3CS1A Electronic Devices & Circuits****Time: 3 Hours****Maximum Marks: 80  
Min. Passing Marks: 26***Instructions to Candidates:**Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.**Units of quantities used/calculated must be stated clearly.**Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)*1. NIL2. NIL**UNIT- I**Q.1 (a) Explain mobility and conductivity. [2×2=4](b) Draw the output waveform for the given circuit. [8](c) What is Hall Effect? [4]**OR**Q.1 (a) Explain Mass action law in detail. [5](b) Derive the continuity equation for n – type semiconductor. [8](c) Give the difference between full wave and half wave voltage multiplier. [3]

## UNIT- II

- Q.2 (a) Design the Hybrid Model of a BJT in common collector mode. [4]  
(b) What is thermal runaway? [2]  
(c) Find operating point of Si – BJT circuit.



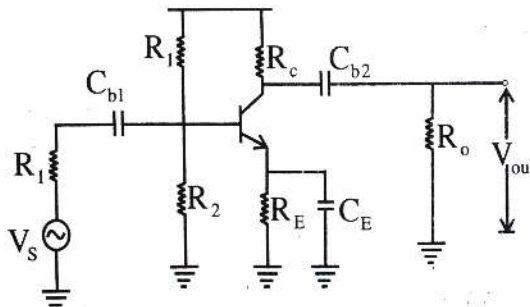
Given that current gain  $\beta = 50$ , and reverse saturation current  $I_{CBO} = 500\mu A$  [10]

**OR**

- Q.2 (a) Explain working of BJT in CE configuration. Also explain its characteristics. [8]  
(b) Derive the relationship between h – parameter of CE and CC configuration. [8]

## UNIT- III

- Q.3 (a) Define the working of FET as voltage variable resistor. [8]  
(b) Draw the AC equivalent of a RC coupled amplifier as shown. [8]

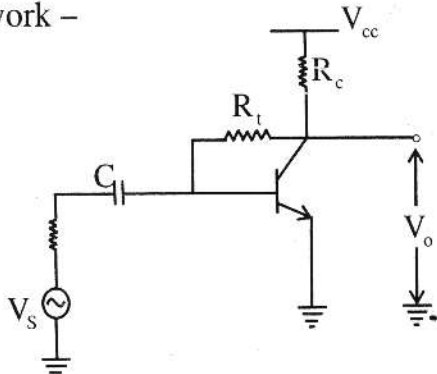


**OR**

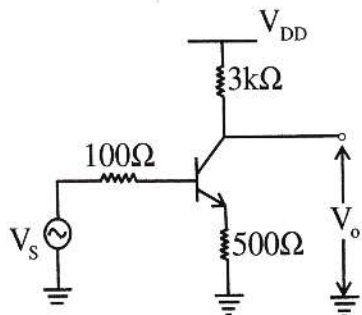
- Q.3 (a) Explain construction and operation of E – MOSFET with clear sketch. [8]  
 (b) Write short note on – [4+4=8]  
 (i) Miller's theorem  
 (ii) Source Follower

**UNIT- IV**

- Q.4 (a) Find general expression for  $R_{if}$  and  $R_{of}$  of a Voltage series feedback amplifier. [8]  
 (b) Find feedback factor ( $\beta$ ), type of feedback and gain with feedback in given network – [8]

**OR**

- Q.4 (a) Explain current shunt feedback with modified input and output in respect of this feedback. [8]  
 (b) Find the value of feedback and its topology. [8]



**UNIT- V**

Q.5 (a) Implement a wien bridge oscillator circuit with –

(i) BJT as active element [Let  $\beta = 100$ ]

(ii) Op - amp as active element [4+4=8]

(b) Describe Hartley oscillator, also explain criteria of oscillation. [4+4=8]

**OR**

Q.5 (a) Explain design of Monostable multi – vibrators. [8]

(b) Design Colpitts oscillator for obtaining oscillation frequency of 10MHz. Assume mutual inductance is negligible. [8]

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3E1652/1612

Roll No. \_\_\_\_\_

Total No of Pages: 4**3E1652/1612****B. Tech. III - Sem. (Main / Back) Exam., Dec. - 2018****Computer Science & Engineering  
3CS2A Data Structures and Algorithms****Time: 3 Hours****Maximum Marks: 80  
Min. Passing Marks: 26***Instructions to Candidates:*

Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)

1. NIL \_\_\_\_\_2. NIL \_\_\_\_\_**UNIT- I**

- Q.1 (a) What is Data Structure? Explain different types of Data structures with advantages and disadvantages. [8]
- (b) What do you understand by array? Suppose multidimensional array A is declared using A [-2:2, 2:22], find the length of each dimension and number of element in A. [8]

**OR**

- Q.1 (a) What is the worst-case complexity of each of the following code fragments? [8]
- ```
for (i=1; i≤n; i++)
{
    for (j=0; j<n; j++)
    {
        sequence of execution
    }
}
```

- (b) Define Algorithm and explain asymptotic notation with suitable example. [8]

UNIT- II

- Q.2 (a) Write an algorithm for implementation of recursion. How a stack is useful in function call and return? [8]
- (b) Explain Tower of Hanoi problem with $n=3$, where n is no. of disks. [8]

OR

- Q.2 (a) How stack is implemented using array in memory? Write an algorithm for PUSH and POP operations. [8]
- (b) Evaluate the following Postfix expression (E) using stack-
 $E = 12, 7, 3, -, 2, 1, 5, +, -, +$ [8]

UNIT- III

- Q.3 (a) Apply Binary search to find 19 in a list: 5,7,9,10,14,19,29,30. Also write the time complexity of Binary Search in worst case. [8]
- (b) How Linked list can be represented in memory? Also write the advantages of Linked List over an array. [8]

OR

- Q.3 (a) How to represent polynomial using Linked List? Also explain with suitable example. [8]
- (b) Write an algorithm to implement enqueue and dequeue operations on a circular queue with proper validations. [8]

UNIT- IV

Q.4 (a) What is a Binary Search Tree (BST)? Create a BST for the following sequence of numbers-

44, 35, 75, 22, 88, 114, 97, 38, 40, 55, 68, 47. Also traverse the tree in Preorder, In order and Post order. [8]

(b) Define Tree. Also explain the difference between the complete binary tree and strictly binary tree with suitable example. [8]

OR

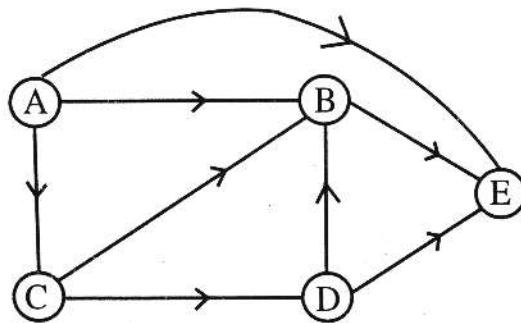
Q.4 (a) Construct an AVL search tree by inserting the following elements in the order of their occurrence. Show the steps clearly.

64, 1, 44, 25, 12, 109, 97, 85. [8]

(b) Explain the threaded binary tree. Evaluate the time complexity of insertion, deletion and traversal in threaded binary tree. [8]

UNIT- V

Q.5 (a) What do you mean by graph data structure? Represent the following graph using sequential and linked representation of graphs. [8]



- (b) Write Prim's algorithm to get minimum spanning tree out of a graph. [8]

OR

- Q.5 (a) Generate a MIN HEAP tree with showing all steps for the following elements: [8]

$\langle 38, 27, 45, 15, 60, 18, 62, 41 \rangle$.

- (b) Sort the following list using Bubble sort. Also calculate its time complexity. [8]

$\langle 37, 94, 35, 21, 64, 11, 46, 67, 62, 16 \rangle$.
