

# CBCS Scheme

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15CS42

## Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Software Engineering

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. What is software? List the fundamental software engineering activities. Mention and explain the key challenges or the general issues facing software engineering. (05 Marks)
- b. List and explain any five software engineering code of ethics. (05 Marks)
- c. Write block diagram for illustrating incremental development model. State at least two benefits and the problems in incremental development. (06 Marks)

OR

- 2 a. Explain functional, non-functional and domain requirements with at least one example for each. (03 Marks)
- b. Write the structure of the requirement document as suggested by IEEE standards. (10 Marks)
- c. List out all the stake-holders in Mental Health Care Patient Management System (MHC-PMS). Write a note on interviewing stake-holders for requirements discovery. (03 Marks)

### Module-2

- 3 Write short notes on:
  - a. Context models with context diagram for MHC-PMS. (06 Marks)
  - b. Interaction models (05 Marks)
  - c. Behavioral models (05 Marks)

OR

- 4 a. Write a neat block diagram and explain the phases of Rational Unified Process (RUP). (06 Marks)
- b. List out all the activities in an object oriented design process. (02 Marks)
- c. What is a sequence model? Write the diagram for sequence model of operations in collecting data from a weather station and explain. (08 Marks)

### Module-3

- 5 a. State and explain development testing and its three levels - unit testing, component testing and system testing. (04 Marks)
- b. List out all the guidelines for testing. (04 Marks)
- c. Explain test-driven development (TDD), with a block diagram. Explain TDD activities and benefits of TDD. (08 Marks)

OR

- 6 a. With appropriate block diagram, explain the software evolution process. (06 Marks)
- b. Define "program evolution dynamics". Discuss Lehman laws for program evolution dynamics. (10 Marks)

**Module-4**

- 7 a. Explain software pricing. List and briefly explain the factors affecting software pricing. (06 Marks)  
b. List and explain various COCOMO cost estimation models. (10 Marks)

**OR**

- 8 a. List out the questions to be answered by the quality management team to divide whether or not the software is fit for its intended purpose. (06 Marks)  
b. Explain the various inspection checklists for software inspection process. (06 Marks)  
c. What are product metrics? Explain its two classes of metrics. (04 Marks)

**Module-5**

- 9 a. Draw the block diagram and explain the process of prototype development. What are the benefits of a prototype? Write briefly about throw away prototypes. (10 Marks)  
b. List and explain any six extreme programming practices. (06 Marks)

**OR**

- 10 a. List all the four key features of testing in XP. (02 Marks)  
b. What is pair programming? List the advantages of pair programming. (04 Marks)  
c. Explain SCRUM. Draw and explain block diagram for the SCRUM process. List all the key characteristics of this process. Mention the advantages of SCRUM. (10 Marks)

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# CBCS Scheme

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15CS43

## Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Define an algorithm. Discuss the criteria of an algorithm with an example. (06 Marks)
- b. Prove that : If  $t_1(n) \in O(g_1(n))$  and  $t_2(n) \in O(g_2(n))$  then  
 $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$  (06 Marks)
- c. Explain the two common ways to represent a graph with an example (04 Marks)

OR

- 2 a. Consider the following algorithm  
Algorithm GUESS (A[ ] [ ])  
for  $i \leftarrow 0$  to  $n - 1$   
  for  $j \leftarrow 0$  to  $i$   
    A [i] [j]  $\leftarrow 0$   
    i) What does the algorithm compute?  
    ii) What is basic operation?  
    iii) What is the efficiency of this algorithm? (03 Marks)
- b. List and explain important problem types that are solved by computer. (07 Marks)
- c. Design an algorithm for checking whether all elements in a given array are distinct or not. Derive its worst complexity. (06 Marks)

### Module-2

- 3 a. Explain divide and conquer technique. Write a recursive algorithm for finding the maximum and minimum element from a list. (08 Marks)
- b. Apply quick sort to sort the list E, X, A, M, P, L, E in alphabetical order. Draw the tree of the recursive calls made. (08 Marks)

OR

- 4 a. Discuss Strassen's matrix multiplication and derive its time complexity. (08 Marks)
- b. Design merge sort algorithm and discuss its best-case, average-case and worst-case efficiency. (08 Marks)

### Module-3

- 5 a. Solve the greedy knapsack problem where  
 $m = 10, n = 4, P = (40, 42, 25, 12), W = (4, 7, 5, 3)$ . (06 Marks)
- b. What is job sequencing with deadlines problem? Let  $n = 5$ , profits [10, 3, 33, 11, 40] and deadlines [3, 1, 1, 2, 2] respectively. Find the optimal solution using greedy algorithm. (05 Marks)
- c. Define minimum cost spanning tree (MST). Write Prim's algorithm to construct minimum cost spanning tree. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Design Dijkstra's algorithm and apply the same to find the single source shortest path for graph taking vertex 'a' as source of Fig. Q6(a). (08 Marks)

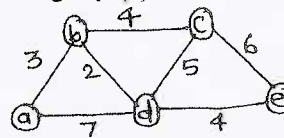


Fig. Q6(a)

- b. Construct a Huffman code for the following data :

Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

Encode the text ABACABAD and decode the text 100010111001010, using the above code.

(04 Marks)

- c. Construct the heap for the list 2, 9, 7, 6, 5, 8 by the bottom-up algorithm. (04 Marks)

**Module-4**

- 7 a. Define transitive closure. Write Warshall's algorithm to compute transitive closure. Find its efficiency. (08 Marks)  
 b. Apply Floyd's algorithm to find all pair shortest path for the graph of Fig. Q7(b). (08 Marks)

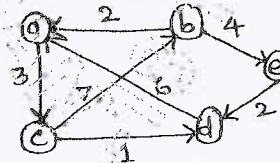


Fig. Q7(b)

OR

- 8 a. For the given cost matrix, obtain optimal cost tour using dynamic programming. (08 Marks)

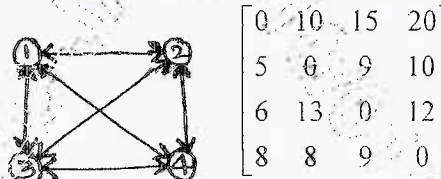


Fig. Q8(a)

- b. Write a pseudocode to find an optimal binary search tree by dynamic programming. (08 Marks)

**Module-5**

- 9 a. Write the pseudocode for backtracking algorithm. Let  $w = \{3, 5, 6, 7\}$  and  $m = 15$ . Find all possible subsets of  $w$  that sum to  $m$ . Draw the state space tree that is generated. (09 Marks)  
 b. Draw the portion of the state space tree for  $m$ -colorings of a graph when  $n = 4$  and  $m = 3$ . (07 Marks)

OR

- 10 a. With the help of a state space tree, solve the Travelling Salesman Problem (TSP) of Fig. Q10(a), using branch-and-bound algorithm. (08 Marks)

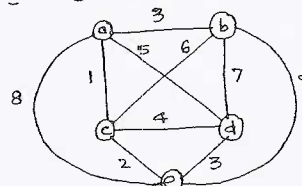


Fig. Q10(a)

- b. Explain the classes of NP – Hard and NP – complete. (08 Marks)

# CBCS Scheme

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15CS44

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Microprocessor and Microcontroller

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Explain the architecture of 8086 microprocessor with a neat diagram along with functions of various blocks. (06 Marks)
- b. With an example distinguish between physical address, logical address and offset address. If CS = 2000 h, DS = 3000 h, SS = 4000 h, ES = 5000 h, BX = 0020 h, BP = 0030 h. Find physical address for (i) MOV AL, [BP] (ii) MOV CX, [BX]. (04 Marks)
- c. Explain the following addressing modes of 8086:
  - i) Register indirect
  - ii) Based indexed indirect
  - iii) Direct memory. (06 Marks)

OR

- 2 a. What are assembler directives? Explain the following assembler directives (i) PROC. (ii) Assume, (iii) PTR. (04 Marks)
- b. Write assembly language program to add 5 bytes of data stored in data segment. (04 Marks)
- c. With syntax, explain the following control transfer instructions:
  - i) Conditional transfer
  - ii) Unconditional transfer instruction. (08 Marks)

### Module-2

- 3 a. Explain the syntax of following instructions with an example:
  - i) DAA ii) MUL iii) AND iv) SHR v) CMP vi) AAM (06 Marks)
- b. Write a program to convert lower case to upper case by reading string from KB and print the converted string at 10<sup>th</sup> row, 20<sup>th</sup> column after clearing the screen. (06 Marks)
- c. Write an ALP to count the number of one's and zero's in a given 8 bit data using rotate instructions. (04 Marks)

OR

- 4 a. Explain the syntax of following instructions with example: i) AAA, ii) Shl, iii) DIV, iv) RCR. (04 Marks)
- b. What is an interrupt? Explain various types with an interrupt vector table. (06 Marks)
- c. Write an ALP to sort a given set of 16 bit numbers in ascending order using any sorting method. (06 Marks)

### Module-3

- 5 a. With an example, explain how to identify over flow and under flow using flags in a flag register for performing arithmetic operation on 16 bit number. (06 Marks)
- b. Write the syntax of following instruction and explain with an example: (i) CBW, (ii) IDIV, (iii) CMPSB, (iv) Xlat. (04 Marks)
- c. Design a memory system for 8086 with one 64 KB RAM and one 64 KB ROM at address 30000h and F0000h show the complete design along with memory mapping and draw the final diagram with address decoder. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. With block diagram, explain 8255 and write control word register format for  $P_A$  output,  $P_B$  input in mode 0. (06 Marks)
- b. Write an ALP to read  $P_B$  and check number of one's in a given 8 bit data at  $P_B$  and display FFh on  $P_A$  if it is even parity else 00h on  $P_A$  if it is odd parity. (05 Marks)
- c. Write a program using string instructions to accept a string from keyboard and check for palindrome and accordingly display appropriate message. (05 Marks)

Module-4

- 7 a. Compare microprocessor with microcontroller. (04 Marks)
- b. Explain the programmer's model of ARM processor with complete register sets available. (04 Marks)
- c. With diagram explain the various blocks in a 3 stage pipeline of ARM processor organization. (04 Marks)
- d. Explain registers used under various modes. (04 Marks)

OR

- 8 a. Explain the structure of ARM cross development tool kit. (06 Marks)
- b. Describe the various modes of operation of ARM processor. (05 Marks)
- c. Explain the various fields in Current Program Status Register (CPSR). (05 Marks)

Module-5

- 9 a. Explain the syntax with example the following instructions of ARM processor (i) MVN, (ii) RSB, (iii) ORR, (iv) MLA, (v) LDR. (05 Marks)
- b. Write a program to display message "Hellow world" using ARM7 instructions. (04 Marks)
- c. Explain various formats of add instructions based on operands of ARM7 processor. (04 Marks)
- d. If  $r_5 = 5$ ,  $r_7 = 8$  and using the following instruction, write values of  $r_5$ ,  $r_7$  after execution `MOV r7, r5, LSL # 2`. (03 Marks)

OR

- 10 a. Explain software interrupt instruction of ARM processor. (04 Marks)
- b. Explain various types of multiply instructions with syntax and example. (04 Marks)
- c. What are the salient features of ARM instruction set? (05 Marks)
- d. If  $r_1 = 0b1111$ ,  $r_2 = 0b0101$ , find  $r_0$  after `BIC r0, r1, r2`. (03 Marks)

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- 6 a. Draw the pin-out diagram of 8086 in maximum mode and minimum mode and explain the minimum mode pins. (08 Marks)
- b. With diagram describe how the demultiplexing of address/data done in 8086 microprocessor. (04 Marks)
- c. Using timing diagram, describe the I/O read bus cycle in 8086  $\mu$ p. (04 Marks)
- d. Write the difference between 8086  $\mu$ p and 8088  $\mu$ p. (04 Marks)
- 7 a. Explain with diagram how 74LS138 decodes 2764 EPROMs for a  $64 \times 8$  section of memory in an 8088 based system. Assume starting address is  $F0000_{16}$ . (08 Marks)
- b. Explain the 8086 memory interfacing with diagram. (08 Marks)
- c. Differentiate between memory mapped I/O and I/O mapped I/O (Isolated I/O). (04 Marks)
- 8 a. Write a note on 82C55 programmable peripheral interface with pin-out diagram. (06 Marks)
- b. Describe the six modes of operation of 8254 counter with diagrams. (06 Marks)
- c. Write a note on interrupt vector table with diagram. (04 Marks)
- d. Write a note on DMA operation. (04 Marks)

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15CS46

**Fourth Semester B.E. Degree Examination, June/July 2018**  
**Data Communication**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing one full question from each module.**

**Module-1**

- 1 a. Define Data Communication. Explain any two fundamental characteristics of Data communication and basic network topology. (08 Marks)
- b. List out the causes of transmission impairment. Explain the characteristics of analog and digital signals. (08 Marks)

**OR**

- 2 a. List out the network criteria. Explain TCP/IP protocol suite with neat diagram. (08 Marks)
- b. Define Line coding and list out its characteristics. Represent the following sequence 1011001011 using polar and bipolar scheme. (08 Marks)

**Module-2**

- 3 a. List out the types of transmission modes. Explain the steps of pulse code modulation process, with an example. (08 Marks)
- b. Explain FSK and QAM modulation process, with suitable example. (08 Marks)

**OR**

- 4 a. Define Multiplexing. Explain synchronous TDM with data rate management and its limitations. (10 Marks)
- b. List out three phases of circuit – switched network. Explain Data gram – switched network. (06 Marks)

**Module-3**

- 5 a. Define Cyclic code. Find the codeword using CRC for given data word 1001 and divisor 1011. (08 Marks)
- b. Define Frames. Explain the steps of flow control at data link layer with diagram. (08 Marks)

**OR**

- 6 a. Explain Stop – and – Wait protocol with neat diagram. (08 Marks)
- b. Explain the frame structure of PPP protocol, with neat diagram. (08 Marks)

**Module-4**

- 7 a. List out the Random Access Protocols and explain CSMA/CA. (10 Marks)
- b. List out channelization protocols. Explain CDMA. (06 Marks)

**OR**

- 8 a. Explain Wireless – LAN, with neat architecture and list out its characteristics. (08 Marks)
- b. Explain the layers of Bluetooth, with neat diagram. (08 Marks)

**Module-5**

- 9 a. List the difference between IPV<sub>4</sub> and IPV<sub>6</sub>. Explain any two methods of converting from IPV<sub>4</sub> to IPV<sub>6</sub>. (08 Marks)
- b. Explain the IP Datagram, Header format, with neat diagram. (08 Marks)

**OR**

- 10 a. Define Home address in mobile IP. Explain three phases for communication in mobile IP. (08 Marks)
- b. Define WiMax. Explain fourth generation (4G) of cellular telephone. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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15CS46

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Data Communication and Networking

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Define data communication. Explain the fundamental characteristics of a data communication system. With a neat diagram, explain the components of data communication. (06 Marks)
- b. Explain TCP/IP protocol suite of computer networks with a neat diagram. (08 Marks)
- c. Assume that five devices are connected in a mesh topology. How many duplex links are needed? How many ports are needed for each? (02 Marks)

OR

- 2 a. Explain different causes for transmission impairments during signal transmission through media. (06 Marks)
- b. Define line coding. List out its characteristics. Represent the sequence 10100110 using polar and biphase schemes. (08 Marks)
- c. A network with a bandwidth of 10 Mbps can pass only an average of 18000 frames per minute with each frame carrying an average of 10000 bits. What is the throughput of this network? (02 Marks)

### Module-2

- 3 a. Explain with suitable diagram PCM encoder used for analog to digital conversion with example. (08 Marks)
- b. Define multiplexing. State and explain the data rate management to handle disparity in input data rates in TDM. (05 Marks)
- c. Four 1 Kbps connections are multiplexed together. A unit is 1 bit. Find:
  - i) Duration of 1 bit before multiplexing.
  - ii) Transmission rate of link.
  - iii) Duration of each time slot. (03 Marks)

OR

- 4 a. Briefly explain with neat diagrams, ASK and FSK modulation techniques and specify the bandwidth requirement. (06 Marks)
- b. We need to send data 3 bits at a time at a bit rate of 3 Mbps. The carrier frequency is 10 MHz. Calculate the number of levels (different frequencies, band rate and band width). (04 Marks)
- c. Explain how message can be sent from one system to another using datagram approach and calculate the total delay with appropriate diagrams. (06 Marks)

### Module-3

- 5 a. Find the code word at sender site using CRC given dataword 101001111 and generator 10111. (05 Marks)
- b. Explain different frame types in HDLC. (06 Marks)
- c. Explain transition phases of PPP protocol. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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OR

- 6 a. Explain with neat diagram, simple parity check code. (06 Marks)  
b. Explain with examples, computation of internet checksum. List the steps undertaken by sender and receiver for error detection. (05 Marks)  
c. Explain stop-and-wait protocol with appropriate diagrams. (05 Marks)

**Module-4**

- 7 a. Explain working of CSMA/CD with suitable flow diagram. (07 Marks)  
b. A network using CSMA/CD has a bandwidth of 10 Mbps. If the propagation time is 25.6  $\mu$ s, what is the minimum size of the frame? (03 Marks)  
c. Define Bluetooth and explain the architecture of the same. (06 Marks)

OR

- 8 a. Define is channelization. Explain CDMA with an example. (06 Marks)  
b. A pure ALOHA network transmits 200 bits frames on a shared channel of 200 kbps. What is the throughput if the system produces 1000 frames per second. (04 Marks)  
c. Discuss 802.3 MAC frame format. (06 Marks)

**Module-5**

- 9 a. Explain the operation of cellular telephony. (06 Marks)  
b. Explain transition from IPV4 to IPV6. (06 Marks)  
c. Discuss special addresses supported by IPV6. (04 Marks)

OR

- 10 a. Explain IP datagram header format with neat diagram and give the description of each field. (08 Marks)  
b. Explain the working of mobile IP with diagram. (08 Marks)

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10CS46

**Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**Computer Organization**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- 1 a. With a neat block diagram, explain the different functional units of a digital computer. (06 Marks)
- b. Explain how byte addressability can be achieved using little endian and big endian memory representation. Write an example for each. (06 Marks)
- c. Perform the following operations on the 5-bit signed numbers using 2's complement representation system. Also indicate whether overflow has occurred or not.
  - i)  $(-10) + (-13)$
  - ii)  $(-10) - (+4)$
  - iii)  $(-3) + (-8)$
  - iv)  $(-10) - (+7)$ . (08 Marks)
- 2 a. Define Addressing Mode, explain the following addressing modes with an example and also show the effective address in each case :
  - i) Absolute
  - ii) Indirect
  - iii) Index (10 Marks)
- b. Illustrate and explain with neat diagrams and examples, how logical shift and rotate instructions are implemented? (10 Marks)
- 3 a. What do you mean by interrupt? Explain polling and vectored interrupts. (06 Marks)
- b. Define bus arbitration. Explain the centralized arbitration with a neat diagram. (06 Marks)
- c. What is DMA? Explain how the DMA controllers are used in a computer system. (08 Marks)
- 4 a. Explain the following with respect to USB :
  - i) Characteristics
  - ii) Architecture
  - iii) Addressing. (10 Marks)
- b. Discuss the main phases involved in the operation of SCSI bus. (08 Marks)
- c. Differentiate between serial port and parallel port. (02 Marks)

**PART - B**

- 5 a. With the help of a neat block diagram, explain the working of a  $1K \times 1$  memory cell organization. (10 Marks)
- b. Explain the memory hierarchy with respect to speed, size and cost with a neat diagram. (05 Marks)
- c. With a block diagram, explain the working principle of direct mapping cache memory. (05 Marks)

- 6 a. Discuss with a neat diagram, the design of a 4-bit carry-look ahead adder. (10 Marks)  
b. Perform multiplication for +13 and -6 using Booth's Algorithm. (05 Marks)  
c. With a neat figure, explain the circuit arrangement for binary division. (05 Marks)
- 7 a. List out the actions needed to execute the instruction Add (R<sub>3</sub>), R<sub>1</sub>. Write and explain sequence of control steps for execution of the same. (10 Marks)  
b. With a neat block diagram, explain hardwired control unit. Show the generation Z<sub>in</sub> and End control signals. (10 Marks)
- 8 a. With a neat diagram, explain the organization of a shared memory multi processor. (08 Marks)  
b. What is hardware multithreading? Explain the two approaches to hardware multithreading. (08 Marks)  
c. Discuss: i) SISD ii) SIMD iii) MIMD iv) MISD. (04 Marks)

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# CBCS Scheme

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15CS32

## Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Analog and Digital Electronics (ADE)

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- Explain the operation and characteristics of N-channel JFET. (08 Marks)
  - With block diagram, explain the operation of a Astable multivibrator using IC 555. (08 Marks)

OR

- With circuit diagram, explain the operation of a Relaxation oscillator. (06 Marks)
  - Fig. Q2(b), shows a Biasing configuration using DEMOSFET given that the saturation drain current is 8mA and the pinch off voltage is -2V.

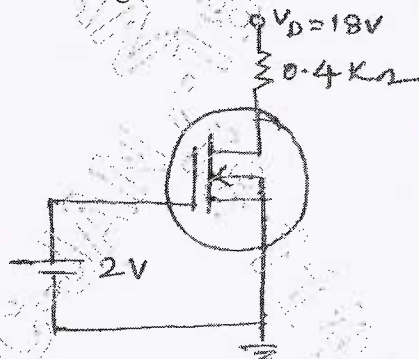


Fig. Q2(b)

- Determine the value of gate source voltage drain current of drain source voltage. (06 Marks)
  - Write the advantages of MOSFET over JFET. (04 Marks)

### Module-2

- Give the simplest logic circuit for following logic equation where d represents don't care condition for following locations:  
 $F(A, B, C, D) = \sum m(7) + d(10, 11, 12, 13, 14, 15)$ . (06 Marks)
  - Simplify the following Boolean function by using Quine – McClusky method.  
 $F(A, B, C, D) = \sum m(0, 2, 3, 6, 7, 8, 10, 12, 13)$ . (10 Marks)

OR

- What are Hazards? Explain the types of Hazards and it covers. (08 Marks)
  - Discuss Briefly an HDL Implementation models. (04 Marks)
  - Explain the concept of Duality in Digital circuits. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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**Module-3**

- 5 a. What is multiplexer? Design a 32:1 multiplexer using 16:1 MUX and one 2:1 multiplexer. (05 Marks)
- b. Show how using a 3 to 8 Decoder and multi input OR Gates following Boolean Expressions can be realized simultaneously. (06 Marks)
- $$F(A, B, C) = \sum m (0, 4, 6)$$
- $$F(A, B, C) = \sum m (1, 2, 3, 7)$$
- $$F(A, B, C) = \sum m (0, 5)$$
- c. Show how two 1 to 16 DEMUX can be connected to get 1 to 32 DEMUX. (05 Marks)

**OR**

- 6 a. Explain parity Generators and checkers using suitable examples. (05 Marks)
- b. What is Magnitude Comparator? Explain 1 bit magnitude comparator. (05 Marks)
- c. What is PLA? Design seven segment Display using PLA. (06 Marks)

**Module-4**

- 7 a. Explain 4 bit serial in parallel out register. (04 Marks)
- b. Explain a 3 bit binary Ripple up counter. Give the block diagram, truth table and output waveforms. (06 Marks)
- c. Explain the working of JK master slave Flip Flop along with implementation using NAND Gates. (06 Marks)

**OR**

- 8 a. Design synchronous MOD – 6 counter with truth table and state diagram. (06 Marks)
- b. What is universal shift Register? Explain any one application of universal shift register with block diagram and truth table. (06 Marks)
- c. Write the comparison between Synchronous and Asynchronous counter. (04 Marks)

**Module-5**

- 9 a. Explain 5 bit Resistive divider with diagram. (06 Marks)
- b. Explain with neat diagram the working principle of Digital clock. (05 Marks)
- c. Explain the terms Accuracy and Resolution for D/A converter. (05 Marks)

**OR**

- 10 a. Explain with Block diagram the operation of successive approximation converter. (08 Marks)
- b. Explain counter type A/D converter with diagram. (08 Marks)

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# GBCS Scheme

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15CS32

## Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Analog and Digital Electronics (ADE)

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- Explain the operation and characteristics of N-channel JFET. (08 Marks)
  - With block diagram, explain the operation of a Astable multivibrator using IC 555. (08 Marks)

OR

- With circuit diagram, explain the operation of a Relaxation oscillator. (06 Marks)
  - Fig. Q2(b), shows a Biasing configuration using DEMOSFET given that the saturation drain current is 8mA and the pinch off voltage is -2V.

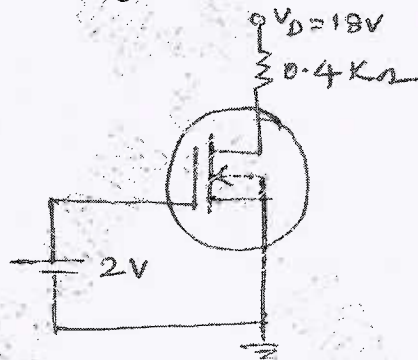


Fig. Q2(b)

- Determine the value of gate source voltage drain current of drain source voltage. (06 Marks)
  - Write the advantages of MOSFET over JFET. (04 Marks)

### Module-2

- Give the simplest logic circuit for following logic equation where d represents don't care condition for following locations:  
 $F(A, B, C, D) = \sum m(7) + d(10, 11, 12, 13, 14, 15)$ . (06 Marks)
  - Simplify the following Boolean function by using Quine – McClusky method.  
 $F(A, B, C, D) = \sum m(0, 2, 3, 6, 7, 8, 10, 12, 13)$ . (10 Marks)

OR

- What are Hazards? Explain the types of Hazards and it covers. (08 Marks)
  - Discuss Briefly an HDL Implementation models. (04 Marks)
  - Explain the concept of Duality in Digital circuits. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50. will be treated as malpractice.



**Module-3**

- 5 a. What is multiplexer? Design a 32:1 multiplexer using 16:1 MUX and one 2:1 multiplexer. (05 Marks)
- b. Show how using a 3 to 8 Decoder and multi input OR Gates following Boolean Expressions can be realized simultaneously. (06 Marks)
- $$F(A, B, C) = \sum m (0, 4, 6)$$
- $$F(A, B, C) = \sum m (1, 2, 3, 7)$$
- $$F(A, B, C) = \sum m (0, 5)$$
- c. Show how two 1 to 16 DEMUX can be connected to get 1 to 32 DEMUX. (05 Marks)

**OR**

- 6 a. Explain parity Generators and checkers using suitable examples. (05 Marks)
- b. What is Magnitude Comparator? Explain 1 bit magnitude comparator. (05 Marks)
- c. What is PLA? Design seven segment Display using PLA. (06 Marks)

**Module-4**

- 7 a. Explain 4 bit serial in parallel out register. (04 Marks)
- b. Explain a 3 bit binary Ripple up counter. Give the block diagram, truth table and output waveforms. (06 Marks)
- c. Explain the working of JK master slave Flip Flop along with implementation using NAND Gates. (06 Marks)

**OR**

- 8 a. Design synchronous MOD – 6 counter with truth table and state diagram. (06 Marks)
- b. What is universal shift Register? Explain any one application of universal shift register with block diagram and truth table. (06 Marks)
- c. Write the comparison between Synchronous and Asynchronous counter. (04 Marks)

**Module-5**

- 9 a. Explain 5 bit Resistive divider with diagram. (06 Marks)
- b. Explain with neat diagram the working principle of Digital clock. (05 Marks)
- c. Explain the terms Accuracy and Resolution for D/A converter. (05 Marks)

**OR**

- 10 a. Explain with Block diagram the operation of successive approximation converter. (08 Marks)
- b. Explain counter type A/D converter with diagram. (08 Marks)

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# CBCS Scheme

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15CS33

## Third Semester B.E. Degree Examination, June/July 2018 Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing  
ONE full question from each module.**

### Module-1

- 1 a. Differentiate between structures and unions. (04 Marks)  
b. Explain with example : i) insertion and ii) deletion in an array. (08 Marks)  
c. Suppose each student in a class of 25 students is given 4 tests, assume the students are numbered from 1 to 25, and the test scores are assigned in the  $25 \times 4$  matrix called SCORE. Suppose Base (SCORE) = 200,  $w = 4$  and the programming language uses row-major order to store this 2D array, then find the address of 3<sup>rd</sup> test of 12<sup>th</sup> student i.e SCORE (12, 3). (04 Marks)

OR

- 2 a. List and explain any 4 functions supported in C for dynamic memory allocation with examples. (08 Marks)  
b. Consider 2 polynomials  $A(x) = 2x^{1000} + 1$  and  $B(x) = x^4 + 10x^3 + 3x^2 + 1$  with a diagram show how these polynomials are stored in 1D array. (02 Marks)  
c. With an example illustrate that "product of 2 sparse matrices may not be sparse". Also write a C function for matrix multiplication of 2 sparse matrices. (06 Marks)

### Module-2

- 3 a. Write an algorithm to evaluate a postfix expression. Evaluate the following postfix expression  $abc + * d c/-$  where  $a = 5, b = 6, c = 2, d = 12, c = 4$ . (06 Marks)  
b. Write the algorithm for Ackermann function. Evaluate  $A(1, 2)$  using ACKERMANN function. (04 Marks)  
c. With a neat diagram explain ONE-WAY list representation of a priority queue. (06 Marks)

OR

- 4 a. Write a C program demonstrating the various stack operations, including cases for overflow and underflow of STACKS. (08 Marks)  
b. Describe how you could model a maze, where 0 represents open paths and 1 represents barriers. What moves are permitted in the matrix model? Provide an example MAZE together with its allowable moves and table of moves. (08 Marks)

### Module-3

- 5 a. Write a function for singly linked lists with integer data, to search an element in the list that is unsorted and a list that is sorted. (08 Marks)  
b. Given 2 singly linked lists. LIST-1 and LIST-2. Write an algorithm to form a new list LIST-3 using concatenation of the lists LIST-1 and LIST-2. (08 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8 = 50$ , will be treated as malpractice.

OR

- 6 a. Write a note on header linked list. Explain the widely used header lists with diagrams. (05 Marks)
- b. List out any 2 differences between doubly linked lists and singly linked list. (02 Marks)
- c. Illustrate with examples how to insert a node at the beginning, INSERT a node at intermediate position, DELETE a node with a given value. (09 Marks)

Module-4

- 7 a. Write a short note on threaded binary trees and state the rules to construct a threaded binary tree. (08 Marks)
- b. With separate functions illustrate recursive search and iterative search of a binary search tree. (08 Marks)

OR

- 8 a. Consider the following tree T in (Fig.8(a)) write the preorder, inorder, postorder for the tree T. Also find the depth of TREE in (Fig.Q8(a)). (04 Marks)

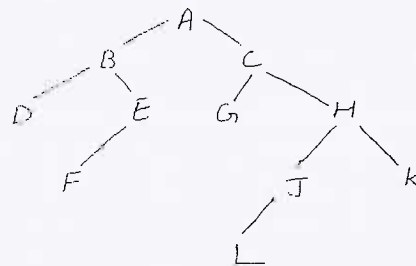


Fig.Q8(a)

- b. Write functions to illustrate "copying of binary trees", and "testing equality of binary trees". (08 Marks)
- c. Define complete binary tree. Illustrate with examples. (04 Marks)

Module-5

- 9 a. State and explain WARSHALLS algorithm with an example. (08 Marks)
- b. Write an algorithm for insertion sort. Apply insertion sort, showing the various passes to sort the array A, where A = [77, 33, 44, 11, 88, 22, 66, 55]. (08 Marks)

OR

- 10 a. Write a short note on hashing. Explain any 3 popular HASH functions. (08 Marks)
- b. What do you understand by the term file organization? Briefly summarize any 3 widely used file organization techniques. (08 Marks)

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# CBCS SCHEME

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15CS34

## Third Semester B.E. Degree Examination, June/July 2018 Computer Organization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Define Addressing Mode. Give the details of different addressing modes. (08 Marks)  
b. Describe the basic operational concepts between the processor and memory. (08 Marks)

OR

- 2 a. What is Subroutine? How to pass parameters to subroutines? Illustrate with an example. (08 Marks)  
b. How to encode assembly instructions into 32-bit words? Explain with examples. (08 Marks)

### Module-2

- 3 a. Define Bus Arbitration. With diagrams, explain the centralized bus arbitration mechanism. (08 Marks)  
b. With the help of timing diagram, briefly discuss the main phases of SCSI bus involved in its operation. (08 Marks)

OR

- 4 a. With neat diagrams, explain how to interface printer to the processor. (08 Marks)  
b. Explain the following methods of handling interrupts from multiple devices.  
i) Interrupt nesting/priority structure ii) Daisy chain method. (08 Marks)

### Module-3

- 5 a. Describe how to translate virtual address into physical address with diagram. (08 Marks)  
b. Draw and explain the internal organisation of  $2M \times 8$  asynchronous DRAM chip. (08 Marks)

OR

- 6 a. Describe any two mapping functions in cache. (08 Marks)  
b. Describe the principles of magnetic disk. (08 Marks)

### Module-4

- 7 a. Perform the operations on 5 - bit signed numbers using 2's complement system. Also indicate whether overflow has occurred. (06 Marks)  
i)  $(-10) + (-13)$  ii)  $(-10) - (-13)$  iii)  $(-2) + (-9)$   
b. Perform the multiplication of 13 and -6 using Booth algorithm and Bit - pair recoding method. (10 Marks)

OR

- 8 a. Perform the restoring division for  $8 \div 3$  by showing all the steps. (06 Marks)  
b. Explain the logic diagram of 4 - bit carry look ahead adder and its operations. (10 Marks)

### Module-5

- 9 a. Draw and explain multiple bus organization along with its advantages. (10 Marks)  
b. Write down the control sequence for the instruction Add  $(R_3), R_1$  for single bus organization. (06 Marks)

OR

- 10 a. With block diagram, explain the general requirements and working of digital camera. (10 Marks)  
b. Write the control sequence for an unconditional branch instruction. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $4^2+8=50$ , will be treated as malpractice.

# CBCS SCHEME

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15CS35

## Third Semester B.E. Degree Examination, June/July 2018

### UNIX and Shell Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

#### Module-1

- 1 a. Explain the architecture of UNIX operating system with a neat diagram. (06 Marks)
- b. What are internal and external commands in UNIX? Explain with any three examples in each type. (06 Marks)
- c. Explain the fields of /etc/passwd and /etc/shadow. (04 Marks)

OR

- 2 a. Write a note on man command with options. (06 Marks)
- b. Explain the following commands with examples :  
i) printf ii) passwd iii) date iv) who. (04 Marks)
- c. Describe with appropriate commands, how to display and set terminal characteristics. (06 Marks)

#### Module-2

- 3 a. Explain UNIX file system with the help of neat diagram. (06 Marks)
- b. Explain briefly absolute and relative pathnames with examples. (04 Marks)
- c. Briefly describe : i) HOME ii) PATH ii) WC iv) pwd. (06 Marks)

OR

- 4 a. Interpret the significance of seven fields of `ls-l` output. (06 Marks)
- b. Assuming the files current permission are `rwX r-- r-x`, specify the `chmod` expression required to change the following using both absolute and relative method of assigning permissions.  
i) `rwXrwX r-x`  
ii) `r-Xr-x--x`  
iii) `r--r---w-` (06 Marks)
- c. Write a note on directory permissions with examples. (04 Marks)

#### Module-3

- 5 a. Explain with a neat diagram, three modes of Vi editor. (06 Marks)
- b. Explain briefly S(substitute command) in exmode of Vi editor. (04 Marks)
- c. Explain the following commands with examples :  
i) set ii) map iii) abbr (06 Marks)

OR

- 6 a. Define wild card. With examples, explain shells wild cards. (06 Marks)
- b. Explain the three standard files with respect to UNIX operating system. (06 Marks)
- c. Write a command for the following using `grep`  
i) To delete all blank lines from a file named `Emp`  
ii) To list only subdirectories in the current directory  
iii) To display lines containing pattern in file `sample` `SIGSTOP` or `SIGTSTP`  
iv) To display number of lines that does not contain pattern `'USA'` in file `times.txt`. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Define shell script. Write a menu driven shell script which displays :
- i) Current users of system
  - ii) List of files
  - iii) Today's date
  - iv) Process status
  - v) Contents of a file
- (06 Marks)
- b. Explain expr command applicable to computation and string functions. (06 Marks)
- c. Explain with example set and shift command in UNIX to manipulate positional parameters. (04 Marks)

**OR**

- 8 a. Explain the following filters with examples :
- i) head ii) tail iii) cut iv) paste.
- (08 Marks)
- b. Differentiate between hardlink and softlink in UNIX with examples. (04 Marks)
- c. Explain the following with examples :
- i) Umask ii) /dev/null and /dev/tty.
- (04 Marks)

**Module-5**

- 9 a. Explain three distinct phases of process creation. Explain how shell is created. (08 Marks)
- b. Explain the following commands with examples.
- i) Running jobs in background (& and nohup)
  - ii) Execute later (at and batch).
- (06 Marks)
- c. Write find command to locate from home directory.
- i) All files having inode number 9076
  - ii) All files named a.out and all C sources files and remove them interactively.
- (02 Marks)

**OR**

- 10 a. Explain string handling functions in Perl with examples. (06 Marks)
- b. Write a Perl program to find whether a given year is leap year or not using command line arguments. (04 Marks)
- c. Explain the following in Perl with examples. i) split ii) join. (06 Marks)

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10CS32

**Third Semester B.E. Degree Examination, June/July 2018**  
**Electronic Circuits**

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer FIVE full questions, selecting atleast TWO questions from each part.**  
**2. Missing data, if any, may be suitably assumed.**

**PART - A**

- 1 a. Example the concept of thermal Runaway in bipolar-junction transistors. (05 Marks)  
 b. Calculate the values of the resistors  $R_C$  and  $R_E$  for the circuit shown in Fig.Q1(b) given that  $R_1 = 5k\Omega$ ,  $R_2 = 1k\Omega$ ,  $\beta = 200$ ,  $V_{CCQ} = 5V$  and  $I_{CQ} = 2mA$ . (assume silicon transistor and  $I_1 \gg I_B$ ). (08 Marks)

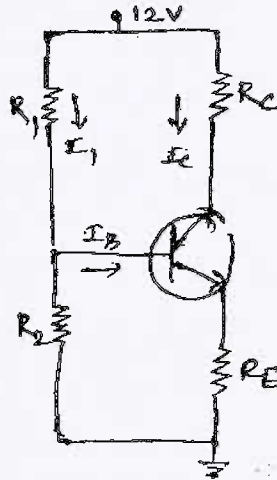


Fig.Q1(b)

- c. Briefly discuss the DC analysis and load line - analyses for the self bias configuration. (07 Marks)
- 2 a. Determine the value of operating point for the circuit shown in Fig.Q2(a) given that threshold voltage for the MOSFET is 2V and  $I_{D(ON)} = 6mA$ , for  $V_{GS(ON)} = 5V$ . (08 Marks)

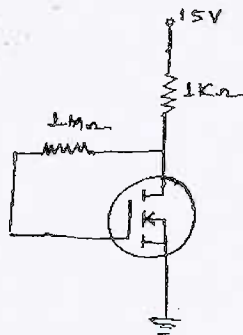


Fig.Q2(a)

- b. Explain with neat sketches the operation and characteristics of CMOS devices. (07 Marks)  
 c. Write short note on handling of MOSFETS. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 3 a. Explain with neat diagrams the working operation types characteristics and parameters of Liquid Crystal Display Devices [LCD]. (10 Marks)
- b. Briefly discuss with necessary diagrams the basic operation of opto-couplers. (05 Marks)
- c. A photodiode has a noise current of 1fA responsivity figure of 0.5A/W calculate its noise equivalent power and detectivity. (05 Marks)
- 4 a. Draw the hybrid equivalent circuit of the transistor in all three configurations given that the hybrid parameters for the transistor are  $h_{ie} = 1.5k\Omega$ ,  $h_{fe} = 150$ ,  $h_{re} = 1 \times 10^{-4}$  and  $h_{oe} = 20 \mu mhos$ . (10 Marks)
- b. What are cascade amplifiers? What are the advantages on overall frequency response of the amplifier? (05 Marks)
- c. Explain the effect of coupling and by pass capacitors on the low frequency response of the transistor based amplifier [SMPS]. (05 Marks)

## PART – B

- 5 a. What are power amplifiers? How are they classified into different classes depending upon their mode of operation? (06 Marks)
- b. A class B amplifier provides a 20V peak output signal to  $15\Omega$  load. The system operates on a power supply of 25V. Determine the efficiency of the amplifier (08 Marks)
- c. The total harmonic distortion of an amplifier reduces from 10% to 1% on introduction of 10% negative feedback. Determine the open loop and closed loop gain values. (06 Marks)
- 6 a. Explain how RC and RL circuit acts as integrator and differentiator. (08 Marks)
- b. With a neat circuit diagram, explain the working operation of voltage-controlled oscillator. (06 Marks)
- c. What are multi-vibrators? Discuss briefly the principle of operation of a stable multi-vibrator with respect to IC 555. (06 Marks)
- 7 a. A regulated power supply provides a ripple rejection of  $-80db$ . If the ripple voltage in the unregulated input were 2V. Determine the output ripple (06 Marks)
- b. Explain with neat diagram and relevant waveforms the working operation of Boost switching voltage regulator. (08 Marks)
- c. Briefly discuss the important features and parameters of switched mode power supplies. (06 Marks)
- 8 a. Fig.Q8(a) shows a second order low pass filter built around a single Op-Amp. Calculate the values of  $R_1$ ,  $R_2$ ,  $C_1$ ,  $C_2$  and  $R_3$ . If the filter had a cut off frequency of 10KHz Q-factor of 0.707 and input impedance not less than  $10K\Omega$ . (08 Marks)

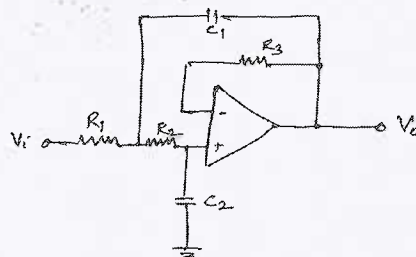


Fig.Q8(a)

- b. What is an absolute value circuit? Draw the circuit schematic of one such circuit configured around Op-Amp and briefly describe its functional principle. (08 Marks)
- c. Discuss briefly the performance parameters and applications of Op-Amps. (04 Marks)



# CBCS Scheme

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15CS33

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Define data structures. Give its classification. (06 Marks)  
b. Define structures with example. (04 Marks)  
c. Define pointers. Give advantages and disadvantages of pointers. (06 Marks)

OR

- 2 a. Write a program to (i) reverse a string, (ii) concatenate two strings. (08 Marks)  
b. Explain dynamic memory allocation in detail. (08 Marks)

### Module-2

- 3 a. Define stack. Implement push and pop functions for stack using arrays. (08 Marks)  
b. Write the postfix form of the following expression:  
(i)  $((6 + (3 - 2) * 4) \uparrow 5 + 7)$  (ii)  $A \$ B \$ C * D$  (08 Marks)

OR

- 4 a. Define queues. Implement Qinsert and Qdelete function for queues using arrays. (08 Marks)  
b. Define recursion. Write recursive program for (i) factorial of a number, (ii) tower of Hanoi. (08 Marks)

### Module-3

- 5 a. Write the following functions for singly linked list: (i) Reverse the list (ii) Concatenate two lists. (08 Marks)  
b. Write functions insert\_front and delete\_front using doubly linked list. (08 Marks)

OR

- 6 a. Write an algorithm to add two polynomials. (08 Marks)  
b. Define sparse matrix. Give sparse matrix representation of linked list for given matrix. (08 Marks)

$$A = \begin{bmatrix} 0 & 0 & 4 & 0 & 0 \\ 6 & 5 & 0 & 0 & 0 \\ 0 & 3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$

### Module-4

- 7 a. What is a tree? Explain :  
i) Binary tree  
ii) Strictly binary tree  
iii) Complete binary tree  
iv) Skewed binary tree (08 Marks)  
b. Given inorder sequence: DJGBHEAFKIC and postorder sequence: JGDHEBKIFCA. Construct binary tree and give preorder traversal. (08 Marks)

OR

- 8 a. Explain threaded binary tree in detail. (08 Marks)  
 b. Write a function to insert an item into an ordered binary search tree (duplicate items are not allowed) (08 Marks)

**Module-5**

- 9 a. Define graph. Give adjacency matrix and adjacency linked list for the given weighted graph in Fig.Q9(a).

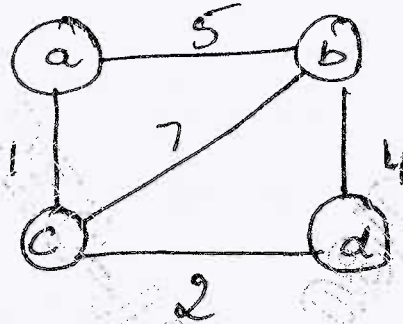


Fig.Q9(a)

- b. Write an algorithm for breadth first search and depth first search.

(08 Marks)

(08 Marks)

OR

- 10 a. Write an algorithm for Radix sort.  
 b. Explain Hashing in detail.

(08 Marks)

(08 Marks)

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# CBCS Scheme

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15CS34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Computer Organization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. List the steps needed to execute the machine instruction Add LOCA, RO in terms of transfers between the processor and the memory along with some simple control commands. Assume that the instruction itself is stored in the memory at location INSTR and that this address is initially in register PC. The first two steps might be expressed as:
- Transfer the contents of Register PC to register MAR.
  - Issue a Read command to the memory and then wait until it has transferred the requested word into register MDR.
- Remember to include the steps needed to update the contents of PC from INSTR to INSTR+1 so that the next instruction can be fetched. (08 Marks)
- b. What is performance measurement? Explain the overall SPEC rating for the computer in a program suit. (08 Marks)

OR

- 2 a. With relevant figure define the little Endian and big Endian assignments. (04 Marks)
- b. Consider a computer that has a byte addressable memory organized in 32 bit words according to the big Endian scheme. A program reads ASCII characters entered at a keyboard and store them in successive byte location starting at location 1000. Show the contents of the two memory words at locations 1000 and 1004 after the name "Johnson" has been entered. (ASCII codes J = 4 AH, o = 6 FH, h = 68 H, n = 6 EH, S = 73 H) (04 Marks)
- c. Write about shift and rotate instruction with neat diagram and example of each. (08 Marks)

### Module-2

- 3 a. With supporting diagram, explain the following with respect to interrupts:
- i) Vectored interrupts
  - ii) Interrupt Nesting
  - iii) Simultaneous requests. (06 Marks)
- b. Three devices A, B and C are connected to the bus of a computer. I/O transfers for all three devices use interrupt control. Interrupt nesting for devices A and B is not allowed, but interrupt requests from C may be accepted while either A or B is being services. Suggest different ways in which this can be accomplished in each of the following cases:
- i) The computer has one interrupt request line.
  - ii) Two interrupt request line, INTR1 and INTR2 are available with INTR1 having higher priority. Specify when and how interrupts are enabled and disable in each case. (06 Marks)
- c. Illustrate the tree structure of USB with diagram. (04 Marks)

OR

- 4 a. With a neat diagram, explain the centralized arbitration and distributed bus arbitration scheme. (08 Marks)
- b. With neat timing diagram illustrate the asynchronous bus data transfer during an input operation. Use handshake scheme. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and for equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. Draw a diagram and explain the working of 16 Megabit DRAM chip configured as  $2M \times 8$ . (08 Marks)  
 b. Describe organization of an  $2M \times 32$  memory using  $512K \times 8$  memory chips. (08 Marks)

**OR**

- 6 a. Discuss in detail the working of set associative mapped cache with two blocks per set with relevant diagram. (08 Marks)  
 b. Define the following with respect to cache memory: (i) Valid bit, (ii) Dirty data, (iii) Stale data, (iv) Flush the cache. (04 Marks)  
 c. A block-set associative cache consists of a total of 64 blocks divided into 4-blocks sets. The main memory contains 4096 blocks, each consisting of 128 words.  
 i) How many bits are there in a main memory address?  
 ii) How many bits are there in each of the TAG, SET and WORD fields? (04 Marks)

**Module-4**

- 7 a. Convert the following pairs of decimal numbers to 5-bit signed 2's complement binary numbers and add them. State whether or not overflow occurs in each case.  
 i) 5 and 10      ii) -14 and 11      iii) -5 and 7      iv) -10 and -13 (04 Marks)  
 b. Design the 16 bit carry look ahead adder using 4-bit adder. Also write the expression for  $C_{i+1}$ . (08 Marks)  
 c. Draw the two n-bit number x and y to perform addition/subtraction. (04 Marks)

**OR**

- 8 a. With an example explain the Booths algorithm to multiply two signed operands. (08 Marks)  
 b. Multiply each of the following pairs of signed 2's complement number using the Booth algorithm. (A = multiplicand and B = multiplier).  
 i)  $A = 010111$  and  $B = 110110$   
 ii)  $A = 110011$  and  $B = 101100$   
 iii)  $A = 110101$  and  $B = 011011$   
 iv)  $A = 001111$  and  $B = 001111$  (08 Marks)

**Module-5**

- 9 a. Discuss with neat diagram, the single bus organization of the data path inside a processor. (08 Marks)  
 b. Write the sequence of control steps required for single bus structure for each of the following instructions.  
 i) Add the contents of memory location NUM to register R1.  
 ii) Add the contents of memory location whose address is at memory location NUM to register R1. (08 Marks)

**OR**

- 10 a. Discuss the microwave oven with neat block diagram. (08 Marks)  
 b. Discuss the digital camera with neat block diagram. (08 Marks)

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# CBCS Scheme

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15CS35

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

## UNIX and Shell Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. List and explain features of UNIX operating system. (07 Marks)
  - b. Discuss internal and external commands, with suitable examples. (06 Marks)
- Write the outputs of the following commands :
- i) cal 8 1947
  - ii) echo 'Todays date is `date`'
  - iii) date + "Date is : %a/%h/%Y". (03 Marks)

OR

- 2 a. Explain "man" documentation, and its internal commands. (08 Marks)
- b. Describe command arguments and options with suitable examples. (04 Marks)
- c. How an ordinary user can become a super user and vice versa? Explain with suitable commands. (04 Marks)

### Module-2

- 3 a. What is a file system? Explain Unix file system with neat diagram, also explain parent and child relationships with suitable examples. (08 Marks)
- b. What is pathname? List and explain types of path-names with an examples. (06 Marks)
- c. Write the command line to perform the followings :
  - i) Change current directory to home directory
  - ii) Change to parent of parent directory. (02 Marks)

OR

- 4 a. What are file permissions? Describe different ways of changing the file permissions. (07 Marks)
- b. Explain CP and Od commands with options. (06 Marks)
- c. Write the output for the following command lines.
  - i) mv filename dir\_name
  - ii) ls | wc -w
  - iii) who | wc -l. (03 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and for equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. List and explain the different modes of Vi editor, also explain different ways of quitting Vi editor. (08 Marks)
- b. Discuss the following commands with respect to Vi editor.  
i) b ii) w iii) | iv) G v) :l, 5w ab.txt vi) h vii) J viii) abbr. (08 Marks)

**OR**

- 6 a. What are wild cards characters? Explain each of them with suitable examples. (08 Marks)
- b. What is the purpose of grep? Explain grep with all options. (06 Marks)
- c. Explain tee command with an example. (02 Marks)

**Module-4**

- 7 a. Explain test command for handling strings. (04 Marks)
- b. Write a shell script using case to perform all arithmetic operations. (06 Marks)
- c. Explain for loop, also possible sources of argument list. (06 Marks)

**OR**

- 8 a. Explain cut command with all options, with examples. (05 Marks)
- b. What are links? How to create different types of links? And list their differences. (06 Marks)
- c. Discuss umask and default file permissions. (05 Marks)

**Module-5**

- 9 a. Discuss how to execute commands periodically with suitable example. (05 Marks)
- b. Explain find command in detail. (06 Marks)
- c. What is process? Explain different mechanisms of process creation. (05 Marks)

**OR**

- 10 a. Explain string handling functions in PERL. (07 Marks)
- b. Write a PERL programs check the given year is leap year or not. (07 Marks)
- c. Explain split function in PERL briefly. (02 Marks)

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# CBCS Scheme

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15CS36

## Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Prove that for any three propositions p, q, r  $[P \rightarrow (q \wedge r)] \Leftrightarrow [(p \rightarrow q) \wedge (p \rightarrow r)]$ . Using truth table. (05 Marks)
- b. Establish the validity of the argument :
 
$$\begin{array}{l} p \rightarrow q \\ q \rightarrow (r \wedge s) \\ \neg r \vee (\neg t \vee u) \\ \hline p \wedge t \\ \hline \therefore u \end{array}$$
(06 Marks)
- c. Prove that for all integers 'k' and 'l', if 'k' and 'l' are both odd, then  $k + l$  is even and  $kl$  is odd by direct proof. (05 Marks)

OR

- 2 a. Determine the truth value of each of the following quantified statements; the universe being the set of all non - zero integers. (05 Marks)
  - i)  $\exists x, \exists y [xy = 1]$
  - ii)  $\exists x, \forall y [xy = 1]$
  - iii)  $\forall x, \exists y, [xy = 1]$
  - iv)  $\exists x, \exists y [(2x + y = 5) \wedge (x - 3y = -8)]$ .
  - v)  $\exists x, \exists y [(3x - y = 17) \wedge (2x + 4y = 3)]$ . (06 Marks)
- b. Find whether the following arguments are valid or not for which the universe is set of all triangles. In triangle XYZ, there is no pair of angles of equal measure. If the triangle has two sides of equal length, then it is isosceles. If the triangle is isosceles, then it has two angles of equal measure. Therefore triangle XYZ has no two sides of equal length. (05 Marks)
- c. If a proposition has truth value 1, determine all truth value assignments for the primitive propositions p, r, s for which the truth value of following compound proposition is 1.  $[q \rightarrow \{(\neg p \vee r) \wedge \neg s\}] \wedge \{\neg s \rightarrow (\neg r \wedge q)\}$ . (05 Marks)

### Module-2

- 3 a. Prove by mathematical induction that, for every positive integer n, 5 divides  $n^5 - n$ . (05 Marks)
- b. For the Fibonacci sequence  $F_0, F_1, F_2, \dots$  prove that  $F_n = \frac{1}{\sqrt{5}} \left[ \left( \frac{1+\sqrt{5}}{2} \right)^n - \left( \frac{1-\sqrt{5}}{2} \right)^n \right]$ . (06 Marks)
- c. Find the coefficient of :
  - i)  $x^9 y^3$  in the expansion  $(2x - 3y)^{12}$
  - ii)  $x^{12}$  in the expansion  $x^3(1 - 2x)^{10}$ . (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 4 a. By mathematical induction. Prove that, for every positive integer  $n$ , the number  $A_n = 5^n + 2 \cdot 3^{n-1} + 1$  is a multiple of 8. (05 Marks)
- b. How many positive integers 'n' can we form using the digits 3, 4, 4, 5, 5, 6, 7 if we want 'n' to exceed 5,000,000. (06 Marks)
- c. A certain question paper contains three parts A, B, C with four questions in part A, five questions in part B and six questions in part C. It is required to answer seven questions selecting atleast two questions from each part. In how many ways can a student select his seven questions for answering? (05 Marks)

**Module-3**

- 5 a. Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = \begin{cases} 3x-5, & \text{for } x > 0 \\ -3x+1, & \text{for } x \leq 0 \end{cases}$
- i) Determine  $f\left(\frac{5}{3}\right)$ ,  $f^{-1}(3)$ ,  $f^{-1}([-5, 5])$ .
- ii) Also prove that if 30 dictionaries contain a total of 61,327 pages, then atleast one of the dictionary must have atleast 2045 pages. (05 Marks)
- b. Prove that if  $f: A \rightarrow B$  and  $g: B \rightarrow C$  are invertible function then  $g \circ f: A \rightarrow C$  is an invertible function and  $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ . (06 Marks)
- c. Let  $A = \{1, 2, 3, 4, 5\}$ . Define a relation  $R$  on  $A \times A$  by  $(x_1, y_1) R (x_2, y_2)$  if and only if  $x_1 + y_1 = x_2 + y_2$ .
- i) Determine whether  $R$  is an equivalence relation on  $A \times A$
- ii) Determine equivalence class  $[(1, 2)]$ ,  $[(2, 5)]$ . (05 Marks)

OR

- 6 a. Let  $f$  and  $g$  be functions from  $\mathbb{R}$  to  $\mathbb{R}$  defined by  $f(x) = ax + b$  and  $g(x) = 1 - x + x^2$ . If  $(g \circ f)(x) = 9x^2 - 9x + 3$ . Determine  $a, b$ . (05 Marks)
- b. Let  $A = \{1, 2, 3, 4, 6, 12\}$ . On  $A$  define the relation  $R$  by  $aRb$  if and only if 'a' divides 'b'
- i) prove that  $R$  is a partial order on  $A$  ii) draw the Hasse diagram iii) write down the matrix of relation. (06 Marks)
- c. Consider the Poset whose Hasse diagram is given below. Consider  $B = \{3, 4, 5\}$ . Refer Fig.Q6(c). Find :
- i) All upper bounds of  $B$
- ii) All lower bounds of  $B$
- iii) The least upper bound of  $B$
- iv) The greatest lower bound of  $B$
- v) Is this a Lattice? (05 Marks)

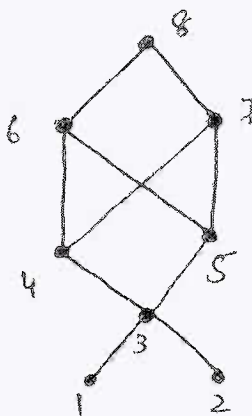


Fig.Q6(c)

2 of 3



**Module-4**

- 7 a. Out of 30 students in a hostel; 15 study history 8 study economics and 6 study geography. It is known that 3 students study all these subjects. Show that 7 or more students study none of these subjects. (05 Marks)
- b. Five teachers  $T_1, T_2, T_3, T_4, T_5$  are to be made class teachers for five classes  $C_1, C_2, C_3, C_4, C_5$ , one teacher for each class.  $T_1$  and  $T_2$  do not wish to become the class teachers for  $C_1$  or  $C_2$ ,  $T_3$  and  $T_4$  for  $C_4$  or  $C_5$  and  $T_5$  for  $C_3$  or  $C_4$  or  $C_5$ . In how many ways can the teachers be assigned work without displeasing any teacher. (06 Marks)
- c. Solve the recurrence relation  $a_n - 6a_{n-1} + 9a_{n-2} = 0$  for  $n \geq 2$ . (05 Marks)

**OR**

- 8 a. Solve the recurrence relation  $a_n - 3a_{n-1} = 5 \times 3^n$  for  $n \geq 1$  given that  $a_0 = 2$ . (05 Marks)
- b. Let  $a_n$  denote the number of n-letter sequences that can be formed using the letters A, B and C such that non terminal A has to be immediately followed by a B. Find the recurrence relation for  $a_n$  and solve it. (06 Marks)
- c. Find the number of permutations of English letters which contain exactly two of the pattern car, dog, pun, byte. (05 Marks)

**Module-5**

- 9 a. Discuss Konigsberg bridge problem. (05 Marks)
- b. Let  $G = G(V, E)$  be a simple graph with  $m$  edges and 'n' vertices. Then prove that :
  - i)  $m \leq \frac{1}{2}n(n-1)$
  - ii) For a complete graph  $K_n$ ,  $m = \frac{1}{2}n(n-1)$  edges
  - iii) How many vertices and edges are there for  $K_{4,7}$  and  $K_{7,11}$ . (06 Marks)
- c. Merge sort the list  $-1, 7, 4, 11, 5, -8, 15, -3, -2, 6, 10, 3$ . (05 Marks)

**OR**

- 10 a. Prove that a tree with 'n' vertices has  $n - 1$  edges. (05 Marks)
- b. Obtain an optimal prefix code for the message LETTER RECEIVED indicate the code and weight. (06 Marks)
- c. Determine whether the following graphs are isomorphic or not. (05 Marks)

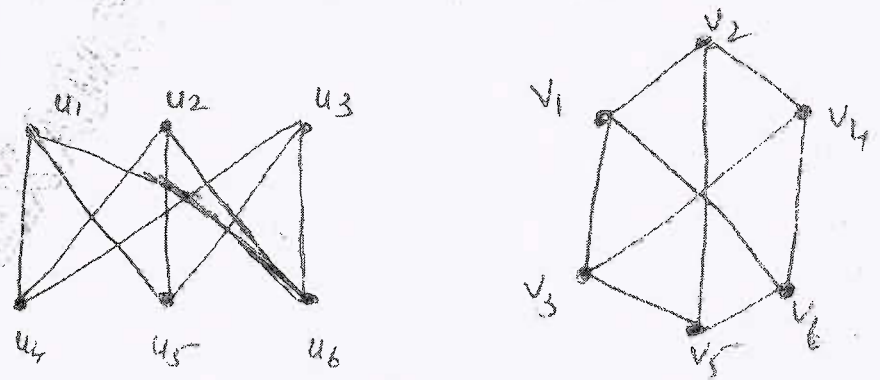


Fig.Q10(c)

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# CBCS SCHEME

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15CS36

## Third Semester B.E. Degree Examination, June/July 2018 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Prove that for any propositions p, q, r the compound proposition :  
 $\{p \rightarrow (q \rightarrow r)\} \rightarrow \{(p \rightarrow q) \rightarrow (p \rightarrow r)\}$  is a tautology. (06 Marks)
- b. Prove the following logical equivalence using the laws of logic:  
 $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \Leftrightarrow \neg (q \vee p)$ . (05 Marks)
- c. Prove the following logical equivalence using the laws of logic:  
 $[\neg p \wedge (\neg q \wedge r)] \vee (q \wedge r) \vee (p \wedge r) \Leftrightarrow r$ . (05 Marks)

**OR**

- 2 a. Prove the validity of the arguments using rule of inference.  

$$\begin{array}{l} (\neg p \vee \neg q) \rightarrow (r \wedge s) \\ r \rightarrow t \\ \neg t \\ \hline \therefore p \end{array}$$
(05 Marks)
- b. Test the validity of the arguments using rule of inference.  

$$\begin{array}{l} (\neg p \vee q) \rightarrow r \\ r \rightarrow (s \vee t) \\ \neg s \wedge \neg u \\ \neg u \rightarrow \neg t \\ \hline \therefore p \end{array}$$
(05 Marks)
- c. Find whether the following argument is valid:  

No Engineering student of 1<sup>st</sup> or 2<sup>nd</sup> semester studies logic  
 Anil is an Engineering student who studies logic

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$\therefore$  Anil is not in second semester.

(06 Marks)

### Module-2

- 3 a. Prove by mathematical induction that :  
 $1^2 + 3^2 + 5^2 + \dots + (2n - 1)^2 = \frac{1}{3} n (2n - 1) (2n + 1)$ . (05 Marks)
- b. A sequence  $\{C_n\}$  is defined recursively by ,  
 $C_n = 3C_{n-1} - 2C_{n-2}$  for all  $n \geq 3$  with  $C_1 = 5$  and  $C_2 = 3$  as the initial conditions, show that  
 $C_n = -2^n + 7$ . (06 Marks)
- c. Determine the coefficient of  $xyz^2$  in the expansion of  $(2x - y - z)^4$ . (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. A certain question paper contains two parts A and B, each containing 4 questions. How many different ways a student can answer 5 questions by selecting atleast 2 questions from each part? (05 Marks)
- b. Prove by mathematical induction that, for every positive integer  $n$ , 5 divides  $n^5 - n$ . (06 Marks)
- c. How many numbers greater than 1000000 can be formed by using the digits 1, 2, 2, 2, 4, 4, 0? (05 Marks)

Module-3

- 5 a. Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be defined by

$$f(x) = \begin{cases} 3x - 5 & \text{for } x > 0 \\ -3x + 1 & \text{for } x \leq 0 \end{cases}$$

Determine  $f^{-1}(0), f^{-1}(1), f^{-1}(-1), f^{-1}(3), f^{-1}(-3), f^{-1}(-6)$ , (06 Marks)

- b. Evaluate  $S(5, 4)$ . (05 Marks)
- c. Let  $f, g, h$  be the function form  $\mathbb{R}$  to  $\mathbb{R}$  defined by  $f(x) = x + 2, g(x) = x - 2, h(x) = 3x$  for all  $x \in \mathbb{R}$ . Find  $g \circ f, f \circ g, f \circ f, h \circ g, f \circ h$ . (05 Marks)

OR

- 6 a. Let 'S' be the set of all non-zero integers and  $A = S \times S$  on A, define the relation R by  $(a, b)R(c, d)$  if and only if  $ad = bc$ . Show that 'R' is an equivalence relation. (06 Marks)
- b. Draw the Hasse diagram representing the positive divisors of 36. (06 Marks)
- c. Let  $A = \{a, b, c, d, e\}$ . Consider the partition  $P = \{\{a, b\}, \{c, d\}, \{e\}\}$  of A. Find the equivalence relation inducing this partition. (04 Marks)

Module-4

- 7 a. In a survey of 260 college students, the following data were obtained. 64 had taken mathematics course, 94 had taken CS course, 58 had taken EC course, 28 had taken both Mathematics and EC course, 26 had taken both Mathematics and CS course, 22 had taken both CS and EC course, and 14 had taken all three types of course. Determine how many of these students had taken none of the three subjects. (05 Marks)
- b. Find the rook polynomial for the  $3 \times 3$  board using expansion formula. (06 Marks)
- c. Solve the recurrence relation :  $a_n + a_{n-1} - 6a_{n-2} = 0 \quad n \geq 2$ , given  $a_0 = -1$  and  $a_1 = 8$ . (05 Marks)

OR

- 8 a. An apple, a banana, a mango and an orange are to be distributed among 4 boys  $B_1, B_2, B_3, B_4$ . The boys  $B_1$  and  $B_2$  do not wish to have an apple, the boy  $B_3$  does not want banana or mango and  $B_4$  refuses orange. In how many ways the distribution can be made so that no boy is displeased. (06 Marks)
- b. How many permutation of 1, 2, 3, 4, 5, 6, 7, 8 are not derangements? (04 Marks)
- c. The number of virus affected files in a system is 1000 (to start with) and this increases 250% every two hours. Use a recurrence relation to determine the number of virus affected files in the system after one day. (06 Marks)

**Module-5**

- 9 a. Define isomorphism. Show that the following graph are isomorphic to each other. Refer Fig.Q9(a). (06 Marks)

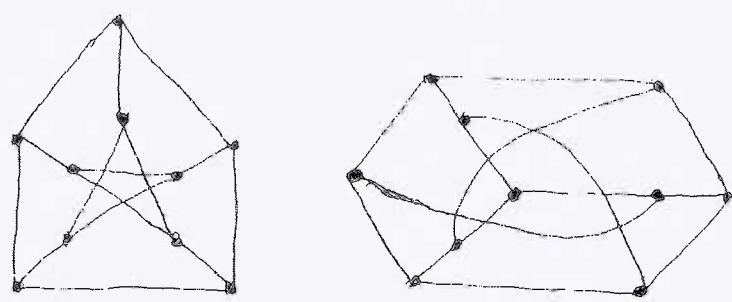


Fig.Q9(a)

- b. "A tree with 'n' vertices is having 'n - 1' edges". Prove the given statement. (05 Marks)
- c. Define complete graph, general graph and Bipartite graph with example for each. (05 Marks)

**OR**

- 10 a. For a graph with 'n' vertices and 'm' edges, if 'δ' is minimum, 'Δ' is maximum of the degree of vertices. Show that :  

$$\delta \leq \frac{2m}{n} \leq \Delta$$
 (05 Marks)
- b. Obtain the optimal prefix code for the message "ROAD IS GOOD". Indicate the code. (06 Marks)
- c. Apply the merge sort to the following given list of element.  
 {-1, 0, 2, -2, 3, 6, -3, 5, 1, 4}. (05 Marks)

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10CS32

**Third Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**Electronic Circuits**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting at least TWO questions from each part.**

**PART - A**

- 1 a. Draw the fixed bias circuit using BJT and derive the expressions for operating point. Mention its advantages and disadvantages. (08 Marks)
- b. For the circuit shown in Fig. Q1(b) determine the operating point. Given  $\beta = 100$ ,  $V_{BE} = 0.7V$  (04 Marks)

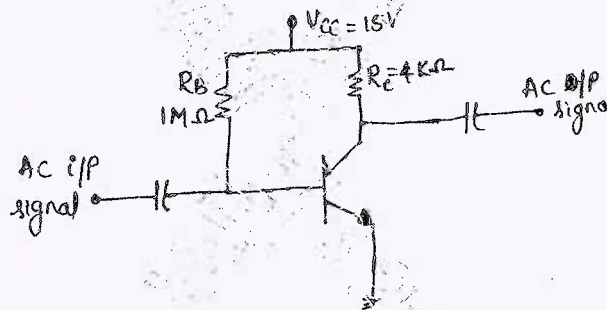


Fig. Q1(b)

- c. Explain the working of transistor as a switch and define delay time, rise time, storage time and fall time with respect to transistor switching. (08 Marks)
- 2 a. Explain the construction, operation and characteristics of N-channel E-MOSFET with sketches. (10 Marks)
- b. Briefly discuss the basic operation of CMOS inverter with a neat diagram. Mention two advantages of CMOS. (06 Marks)
- c. List the difference between JFET's and MOSFETS (any four). (04 Marks)
- 3 a. What is an optocouplers? Explain the parameters of optocouplers in brief. (06 Marks)
- b. Explain any six characteristics parameters of photo sensors. (06 Marks)
- c. Explain the basic operation and construction of LED and also discuss the different LED characteristics. (08 Marks)
- 4 a. Draw the generalized h-parameter model of a transistor based amplifier and derive the expression for :
  - i) Current gain
  - ii) Input Impedance
  - iii) Voltage gain
  - iv) Output admittance. (10 Marks)
- b. Discuss the effect of coupling and bypass capacitors on the low frequency response of the voltage divider BJT amplifier with relevant sketches. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

**PART - B**

- 5 a. Derive the expression for voltage gain, Input resistances and output resistance in case of voltage series feedback with a neat diagram. (10 Marks)
- b. What are the advantages of negative feedback? (06 Marks)
- c. An amplifier without feedback has a voltage gain of 100.  
i) Determine the gain of the amplifier with an introduction of 10% negative feedback.  
ii) Also find the feedback factor, if the gain required with feedback is 50. (04 Marks)
- 6 a. Explain the operation of monostable multi-vibrator with a neat diagram. (using BJT). (08 Marks)
- b. Explain RC low pass circuit and discuss the behavior of this circuit for step and pulse inputs. (08 Marks)
- c. Write a note on Barkhausen criterion. (04 Marks)
- 7 a. Explain the operation of buck regulator with relevant diagrams. (10 Marks)
- b. Design mains transformer with the following specifications,  
Assume  $B = 60,000$  lines/sq.inch.  
Primary voltage : 220V, 50Hz  
Secondary voltage : i) 5V at 1 A and efficiency is 90%  
ii) 12 - 0 - 12V at 100mA efficiency is 90% (06 Marks)
- c. Define line regulation and load regulation for a regulated power supply. (04 Marks)
- 8 a. Define the following as referred to op-amp  
i) Bandwidth  
ii) CMRR  
iii) PSRR  
iv) Slew rate  
v) Open loop gain  
vi) Settling time (06 Marks)
- b. Give a comparison between ideal op-amp with practical op-amp. (06 Marks)
- c. With neat figure and relevant waveform, explain the working of relaxation oscillator circuit using op-amp. (08 Marks)

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10CS35

**Third Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**Data Structures with C**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
atleast TWO questions from each part.**

**PART – A**

1.
  - a. What are the various memory allocation techniques? Explain them with example. (06 Marks)
  - b. What is recursion? What are the various types of recursion explain with example. (06 Marks)
  - c. What is a magic square? What is the procedure given by coxeter to generate the magic square? (08 Marks)
2.
  - a. Point out the differences between malloc( ) and calloc( ) (04 Marks)
  - b. Write an algorithm to add two polynomials using abstract data type polynomial. (08 Marks)
  - c. Write an algorithm to search for an element in the sparse matrix represented as a triple. (08 Marks)
3.
  - a. Define stack, write an ADT of it. (04 Marks)
  - b. Convert the following infix to postfix notations.
    - i)  $((A + (B - C) * D) ^ E + F)$
    - ii)  $X ^ Y ^ Z - M + N + P / Q.$  (06 Marks)
  - c. Write an algorithm to implement queue full and queue empty functions for the non – circular queue. (10 Marks)
4.
  - a. What are linked lists? Point out its types and how a linked list is represented in 'C'? (04 Marks)
  - b. Write a 'C' functions to insert an item at the front end of the list. (04 Marks)
  - c. What are double – linked lists. Explain the procedure or a 'C' function how to insert a node at the front end and at the rear end. (10 Marks)
  - d. Point out any two differences between single and double link lists. (02 Marks)

**PART – B**

5.
  - a. Define the following : i) Strictly binary tree      ii) Skewed tree  
 iii) Complete binary tree      iv) Binary search tree. (04 Marks)
  - b. Consider a binary tree, given in Fig.Q5(b).  
 Write the preorder, postorder and inorder traversals of the binary tree of Fig.Q5(b) (06 Marks)

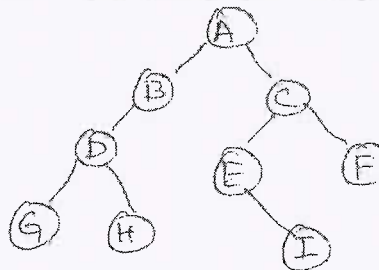


Fig.Q5(b)

- c. Write a 'C' functions to traverse the tree in inorder, preorder, and postorder level. (06 Marks)
- d. What are threaded binary trees? What are its types? How they are different from normal binary trees. (04 Marks)

- 6 a. What is a binary search tree? Explain how to insert an element in it. (05 Marks)  
 b. Consider the following forest given in Fig. 6(b) and convert the forest into a binary tree. (05 Marks)

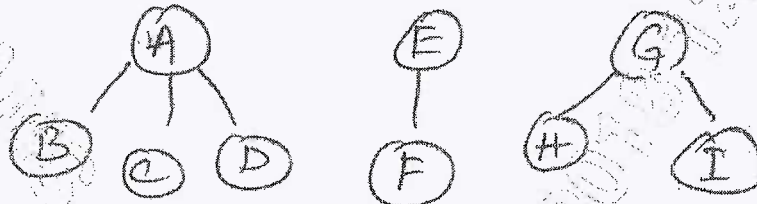


Fig. Q6(b)

- c. What is a selection tree? What are its types and explain them briefly. (04 Marks)  
 d. What is an adjacency matrix and adjacency list explain both with an example. (06 Marks)
- 7 a. What is single ended and double ended priority queues? (03 Marks)  
 b. What is a binomial heap? What are the types of binomial heaps? (06 Marks)  
 c. What is a Fibonacci heap? What are the types of Fibonacci heaps? (06 Marks)  
 d. What is a pairing heap? What are its types? (05 Marks)
- 8 a. What is an AVL tree? Write an algorithm to create an AVL tree. (10 Marks)  
 b. What is a Red Black tree? What is the rank of a node in a red-black tree? How a red-black tree can be represented? (10 Marks)

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10CS36

**Third Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**Object Oriented Programming with C++**

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions, selecting  
atleast TWO questions from each part.*

**PART – A**

- 1
  - a. Explain basic data types available in C++, briefly with examples. (05 Marks)
  - b. What is inline function? Mention its advantages and also write a program to find cube of a given number. (05 Marks)
  - c. What is function overloading? Write a C++ program to find area of circle, triangle and rectangle by overloading the function area. (05 Marks)
  - d. Explain reference variable in C++. Also write a program to swap values of two given variables using reference variables. (05 Marks)
  
- 2
  - a. Explain how to achieve data hiding and encapsulation in C++, with suitable program. (08 Marks)
  - b. What are constructor and destructor? Can you overload constructor and destructor? Justify with suitable example. (08 Marks)
  - c. Explain static data member of a class. Also write a program to count the number of objects created. (04 Marks)
  
- 3
  - a. What is friend function? Write a program using bridge friend function swap to exchange the values of two variables and also display the result before and after swapping. (10 Marks)
  - b. Write a C++ program to add two complex numbers by overloading the operator + using member function. (05 Marks)
  - c. What is template function? Write a program using template function large to find the largest of three ints and three double numbers. (05 Marks)
  
- 4
  - a. How to achieve reusability in C++? Illustrate with an example. (10 Marks)
  - b. Explain the differences between the three visibility modes, with suitable example. (10 Marks)

**PART – B**

- 5
  - a. Explain how to pass arguments to base class constructors in multiple inheritance, with suitable example. (10 Marks)
  - b. Explain with the suitable diagram and program the virtual base class. (10 Marks)
  
- 6
  - a. What is runtime polymorphism? How to achieve it? Illustrate with an example program. (10 Marks)
  - b. Explain pure virtual function and abstract class with suitable programs. (10 Marks)
  
- 7
  - a. Explain with the neat diagram, the stream class hierarchy. (07 Marks)
  - b. Explain any five manipulators, with example. (06 Marks)
  - c. Explain briefly various file operations. (07 Marks)
  
- 8
  - a. What is exception? Explain briefly exception handling options. (10 Marks)
  - b. What is STL? Explain vector container briefly. (10 Marks)

\* \* \* \* \*

important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

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15CS42

## Fourth Semester B.E. Degree Examination, June/July 2018 Software Engineering

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing one full question from each module.**

### Module-1

- 1 a. What are the essential attributes of good software? Explain the key challenger facing in software engineering. (08 Marks)
- b. Explain four steps in spiral model of requirements elicitation and analysis process. And why the understanding of requirements from stake holders is difficult task? Explain. (08 Marks)

**OR**

- 2 a. What is a software process model? Explain the types of software process models. (05 Marks)
- b. What is requirement specification? Explain various ways of writing system requirements. (06 Marks)
- c. Explain the different checks to be carried during requirement validation process. (05 Marks)

### Module-2

- 3 a. Draw and explain use case modeling and sequence diagram for patient information system. (10 Marks)
- b. With a diagram, explain the phases in the Rational Unified Process (RUP). (06 Marks)

**OR**

- 4 a. Draw and explain state diagram of a microwave oven. (07 Marks)
- b. What is design pattern? Explain four essential elements of design pattern. (05 Marks)
- c. Explain the general models of open source licenses. (04 Marks)

### Module-3

- 5 a. What is test driven development? With neat diagram, explain test driven development process. (08 Marks)
- b. With neat diagram, explain six stages of acceptance testing process. (08 Marks)

**OR**

- 6 a. With neat diagram, explain the software evolution process. (05 Marks)
- b. Explain three different types of software maintenance. (03 Marks)
- c. Draw a chart showing relative business value and system quality of legacy system management and explain four clusters of systems. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. For the set of tasks shown below draw the project scheduling using,  
 i) Activity bar chart  
 ii) Staff allocation chart

(10 Marks)

Task	Duration (Days)	Dependencies
T <sub>1</sub>	10	-
T <sub>2</sub>	15	-
T <sub>3</sub>	15	T <sub>1</sub> (M1)
T <sub>4</sub>	10	-
T <sub>5</sub>	10	T <sub>2</sub> , T <sub>4</sub> (M3)
T <sub>6</sub>	5	T <sub>1</sub> , T <sub>2</sub> (M4)
T <sub>7</sub>	20	T <sub>1</sub> (M1)
T <sub>8</sub>	25	T <sub>4</sub> (M2)
T <sub>9</sub>	15	T <sub>3</sub> , T <sub>6</sub> (M5)
T <sub>10</sub>	15	T <sub>7</sub> , T <sub>8</sub> (M6)
T <sub>11</sub>	10	T <sub>9</sub> (M7)
T <sub>12</sub>	10	T <sub>10</sub> , T <sub>11</sub> (M8)

- b. Explain briefly the algorithmic cost modeling and write the difficulties.

(06 Marks)

**OR**

- 8 a. Write any four product and process standards.  
 b. Explain briefly the software review process.  
 c. Explain briefly the process of product measurement.

(04 Marks)

(06 Marks)

(06 Marks)

**Module-5**

- 9 a. State and explain the principles of agile methods.  
 b. Write a note on pair programming.  
 c. List the advantages of SCRUM used in a telecommunication software development environment.

(05 Marks)

(06 Marks)

(05 Marks)

**OR**

- 10 a. Explain the practices involved in the extreme programming.  
 b. How the agile methods are scaled? State the coping of agile methods for large system engineering.

(10 Marks)

(06 Marks)

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15CS43

## Fourth Semester B.E. Degree Examination, June/July 2018 Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Write an algorithm to find the maximum element in an array of  $n$  element. Give the mathematical analysis of this non-recursive algorithm. (06 Marks)
- b. Explain the asymptotic notations BigO, Big $\Omega$  and big theta used to compare orders of growth of an algorithm. (06 Marks)
- c. Explain with an example how a new variable count introduced in a program can be used to find the number of steps needed by a program to solve a particular problem instance. (04 Marks)

OR

- 2 a. Write a recursive function to find and print all possible permutations of a given set of  $n$  elements. (05 Marks)
- b. Solve the recurrence relation :  $M(n) = 2M(n - 1) + 1$ . Take  $M(1) = 1$ .  $M(n)$  is given for  $n > 1$ . (05 Marks)
- c. Define algorithm. What are the criteria that an algorithm must satisfy? (06 Marks)

### Module-2

- 3 a. Write a function to find the maximum and minimum elements in a given array of  $n$  elements by applying the divide and conquer technique. (06 Marks)
- b. Explain the divide and conquer technique. Give the general algorithm DAndC(P)[Where P is the problem to be solve] to illustrate this technique. (04 Marks)
- c. Apply source removal method to obtain topological sort for the given graph in Fig.Q3(c). (06 Marks)

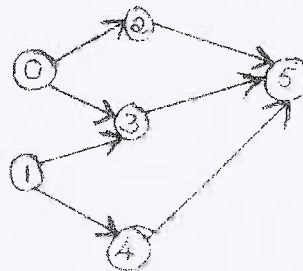


Fig.Q3(c)

OR

- 4 a. Explain the merge sort algorithm. Illustrate with an example and give the worst case efficiency of merge-sort. (08 Marks)
- b. Apply quick sort algorithm to the following set of numbers. (08 Marks)  
65, 70, 75, 80, 85, 60, 55, 50, 45.

**Module-3**

- 5 a. Apply greedy method to obtain an optimal solution to the knapsack problem given  $M = 60$ ,  $(w_1, w_2, w_3, w_4, w_5) = (5, 10, 20, 30, 40)$   $(p_1, p_2, p_3, p_4, p_5) = (30, 20, 100, 90, 160)$ . Find the total profit earned. **(04 Marks)**
- b. Explain Huffman algorithm. With an example show the construction of Huffman tree and generate the Huffman code using this tree. **(06 Marks)**
- c. Apply Prim's algorithm to obtain a minimum spanning tree for the given weighted connected graph. [Fig.Q5(c)]. **(06 Marks)**

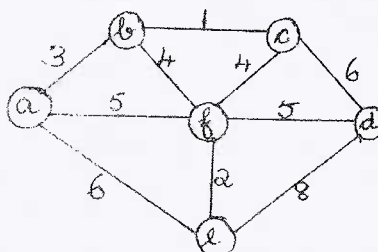


Fig.Q5(c)

**OR**

- 6 a. Explain the bottom up heap construction algorithm with an example. Give the worst case efficiency of this algorithm. **(08 Marks)**
- b. Apply single source shortest path problem assuming vertex a as source. [Refer Fig.Q6(b)]. **(08 Marks)**

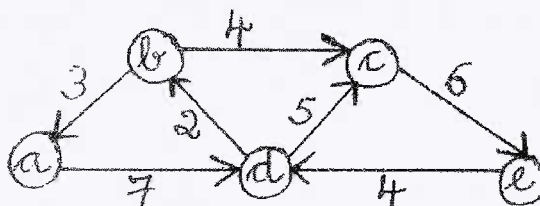


Fig.Q6(b)

**Module-4**

- 7 a. Explain multistage graph with an example. Write multistage graph algorithm using backward approach. **(08 Marks)**
- b. Apply Floyd's algorithm to solve all pair shortest path problem for the graph given below in Fig.Q7(b). **(08 Marks)**

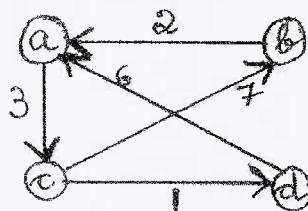


Fig.Q7(b)

OR

- 8 a. Explain Bellman Ford al to find shortest path from single source to all destinations for a directed graph with negative edge cost. (08 Marks)  
 b. Apply Warshall's algorithm to the digraph given below in Fig.Q8(b) and find the transitive closure. (08 Marks)

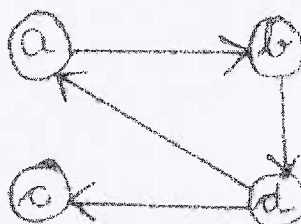


Fig.Q8(b)

Module-5

- 9 a. Apply backtracking method to solve subset-sum problem for the instance  $d = 30$  and  $S = \{5, 10, 12, 13, 15, 18\}$ . Give all possible solutions. (08 Marks)  
 b. Explain how travelling salesman problem can be solved using branch and bound technique. (06 Marks)  
 c. Define deterministic and non deterministic algorithms. (02 Marks)

OR

- 10 a. What is Hamiltonian cycle? Explain the algorithm to find the Hamiltonian cycle in a given connected graph. Write the functions used for generating next vertex and for finding Hamiltonian cycles. (09 Marks)  
 b. Apply the best-first branch-and-bound algorithm to solve the instance of the given job assignment problem. (07 Marks)

	Job1	Job2	Job3	Job4	
(	9	2	7	8	Person a
	6	4	3	7	Person b
	5	8	1	8	Person c
	7	6	9	4	Person d

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15CS44

## Fourth Semester B.E. Degree Examination, June/July 2018 Microprocessors and Microcontrollers

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. What is a microprocessor? With a neat diagram explain the internal block diagram of 8086 microprocessor along with functions of each block and registers. (10 Marks)
- b. What is an addressing mode? List the addressing modes of 8086  $\mu$ p with one example each (any six modes). (06 Marks)

OR

- 2 a. What are the assembler directives? Explain the following assembler directives:  
(i) DB (ii) Assume (iii) OFFSET (iv) PTR (04 Marks)
- b. What is a flag and flag register? Explain the format of flag register with a suitable example. (06 Marks)
- c. Write an assembly level program (ALP) to sort a given set of 'n' 16-bit numbers in descending order. Using Bubble sort algorithm to sort given elements. (06 Marks)

### Module-2

- 3 a. Explain the following instructions with a suitable example:  
(i) MOV (ii) PUSH (iii) LEA (iv) SHR  
(v) ROL (vi) CMP (vii) DAA (viii) TEST. (08 Marks)
- b. What is an interrupt? Explain various types with an interrupt vector table. (08 Marks)

OR

- 4 a. Explain the following instructions with a suitable example:  
(i) XLAT (ii) RCR (iii) AAA (iv) MUL  
(v) DIV (vi) LOOP (vii) ROL (viii) OR (08 Marks)
- b. Explain rotate instructions with an example. (08 Marks)

### Module-3

- 5 a. With example, explain how to identify overflow and underflow using flags in a flag register for performing an arithmetic operation on 16-bit numbers. (08 Marks)
- b. Explain 74138 decoder configuration to enable the memory address 08000H to 0FFFFH to connect four 8K RAMS. (08 Marks)

OR

- 6 a. Briefly explain the control word format of 8255 IC in I/O mode and BSR mode. Find the control word if  $P_A = \text{out}$ ,  $P_B = \text{in}$ ,  $P_{C0} - P_{C3} = \text{in}$  and  $P_{C4} - P_{C7} = \text{out}$ . Use port address of 300H - 303H for the 8255 chip. Then get data from port A and send it to port B. (08 Marks)
- b. Write an assembly level program (ALP) to read  $P_B$  and check number of one's in a 8-bit data as  $P_A$  and display FFh on  $P_A$  if it is even parity else 00h on Port A ( $P_A$ ) if it is an odd parity. (08 Marks)

**Module-4**

- 7 a. Compare CISC with RISC. (05 Marks)  
 b. Explain registers used under various modes. (05 Marks)  
 c. Explain ARM core data flow model with a neat diagram. (06 Marks)

**OR**

- 8 a. Explain the architecture of a typical embedded device based in ARM core with a neat diagram. (08 Marks)  
 b. Explain the various fields in the current program status register. (08 Marks)

**Module-5**

- 9 a. Explain the following instructions of ARM processor with suitable example:  
 (i) MVN (ii) RSB (iii) ORR (iv) MLA  
 (v) SMULL (vi) LDR (vii) SWP (viii) SWPB (08 Marks)  
 b. Explain various formats of ADD instructions based on operands of ARM7 processor. (04 Marks)  
 c. If  $r_5 = 5$ ,  $r_7 = 8$  and using the following instruction, write values of  $r_5$ ,  $r_7$  after execution  
 MOV  $r_7, r_5, LSL \# 2$  (04 Marks)

**OR**

- 10 a. Explain software interrupt instruction of ARM processor. (06 Marks)  
 b. Explain various types of SWAP instructions with syntax and example. (06 Marks)  
 c. What are the silent features of ARM instruction set? (04 Marks)

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15CS45

## Fourth Semester B.E. Degree Examination, June/July 2018 Object Oriented Concepts

Time: 3 hrs.

Max. Marks: 80

**Note:** Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. State the important features of Object Oriented programming paradigm. (08 Marks)  
b. Write a C++ program to get employees details (empno, ename, bsalary(initialized to 1000 by constructor) and allowance) of Employee class through keyboard using the method Getdata( ) and display them using the method Dispdata( ) on console in the format empno, ename, bsalary, allowance. (08 Marks)

OR

- 2 a. Describe function Prototype, with an example. (04 Marks)  
b. Explain namespace, with an example. (04 Marks)  
c. Define Function Overloading and write a C++ program for finding areas of circle ( $\pi * r * r$ ), rectangle ( $l * b$ ) and square ( $x * x$ ) by getting r, l, b and x through keyboard and printing the areas on console using the method Area( ) applying the concept of function overloading. (08 Marks)

### Module-2

- 3 a. State the features used in C++ which are eliminated in Java. Why? (04 Marks)  
b. Discuss briefly the concept of byte code in Java. (04 Marks)  
c. Explain the structure of a Java program and its keywords with an example. (08 Marks)

OR

- 4 a. How arrays are defined in Java? Explain with an example. (04 Marks)  
b. Elucidate how Java is a platform independent language, with neat sketches. (06 Marks)  
c. Write a Java program to print factorial of the number 'n' using for loop. (06 Marks)

### Module-3

- 5 a. Explain package and its types and import command in Java with examples. (08 Marks)  
b. Write a Java program to define an interface called Area which contains method called Compute( ) and calculate the areas of rectangle ( $l * b$ ) and triangle ( $1/2 * b * h$ ) using classes Rectangle and Triangle. (08 Marks)

OR

- 6 a. Define the role of Exception handling in software development. (02 Marks)  
b. Write a Java program for illustrating the exception handling when a number is divided by zero and an array has a negative index value. (06 Marks)  
c. Elucidate the concept of inheritance and its classifications in Java with sketches. (08 Marks)

### Module-4

- 7 a. Define the concept of multithreading in Java and explain the different phases in the life cycle of a thread, with a neat sketch. (08 Marks)  
b. Discuss briefly Synchronization in Java (2). (02 Marks)  
c. Write an example Program for implementing static synchronization in Java. (06 Marks)

OR

- 8 a. Elucidate the two ways of making a class threadable, with examples. (08 Marks)  
b. Describe the delegation event model and explain what happens internally at a button click. (08 Marks)

**Module-5**

- 9 a. Briefly explain Applets. (03 Marks)  
b. Elucidate Lucidly the skeleton of an Applet. (05 Marks)  
c. Write a Java program to play an audio file using Applet. (08 Marks)

OR

- 10 a. Write the advantages of swing over AWT. (04 Marks)  
b. Write a brief note on Containers in swing. (04 Marks)  
c. Write a swing program for displaying anyone of the options. C , C++ , Java, Php through the selection of Combo box by clicking show button. (08 Marks)

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10CS45

**Fourth Semester B.E. Degree Examination, June/July 2018**  
**Microprocessors**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.**

**PART – A**

- 1 a. Define microprocessor. Briefly discuss evolution of microprocessors. (06 Marks)
- b. Draw and explain the block diagram of computer system showing address, data and control bus structure. (06 Marks)
- c. Why 8086 memory is divided into segments? Explain the use of Segment, Pointer and Index registers. (08 Marks)
  
- 2 a. Explain protected mode addressing of 80286 through Core2 64-bit processors. (12 Marks)
- b. Explain with an example, various program memory addressing modes (any 4 addressing modes). (08 Marks)
  
- 3 a. Explain the coding format of MOV instruction. Also generate opcode for the following instruction :  
MOV WORD PTR [BX + 1000H], 1234H (10 Marks)
- b. Explain the following instructions with an example for each :  
(i) LES (ii) MOVS (iii) XLAT (iv) MUL (v) CBW (05 Marks)
- c. Explain the following assembler directives with an example for each :  
(i) DB (ii) ORG (iii) ASSUME (iv) PROC (v) USES (05 Marks)
  
- 4 a. Explain the following instructions with example for each :  
(i) DAA (ii) AAS (iii) AAM (iv) WAIT (v) BOUND (10 Marks)
- b. Write an 8086 assembly language program to separate odd and even numbers in an array. (06 Marks)
- c. Write an 8086 assembly language program to read a key from the keyboard and store its hexadecimal value in memory location TEMP (Use IF...ELSE statements). (04 Marks)

**PART – B**

- 5 a. What is an inline assembly? Explain the basic rules of the same for 16-bit DOS applications. (08 Marks)
- b. Differentiate between :  
(i) Assembler and Linker  
(ii) Public and EXTRN  
(iii) Macros and Procedures (06 Marks)
- c. Write an 8086 ALP to find largest of 3 numbers. (06 Marks)
  
- 6 a. Explain the functions of following pins of 8086 microprocessor :  
(i) READY (ii)  $\overline{\text{BHE}}$  (iii) ALE (iv)  $\overline{\text{M/IO}}$  (v) NMI (vi) HOLD (06 Marks)
- b. Draw and explain minimum mode memory read machine cycle of 8086. (06 Marks)
- c. With an internal block diagram, explain 8288 bus controller. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 7 a. Briefly explain the following memory devices :  
(i) ROM (ii) PROM (iii) EPROM (iv) EEPROM (v) SRAM (vi) DRAM (06 Marks)
- b. Design an interface between 8086 MPU and two chips of 16k×8 EPROM and two chips of 32k×8 RAM, Select the starting address of EPROM suitably. (08 Marks)
- c. Differentiate between I/O - mapped - I/O and memory-mapped - I/O. (06 Marks)
- 8 a. Explain different I/O modes of operation of 8255. (06 Marks)
- b. With an internal block diagram, explain 8254 Programmable Interval Timer. (06 Marks)
- c. Explain the structure of 8086 interrupt vector table with a neat diagram. (08 Marks)

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