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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: IT-301 **Subject: Theory of Computation**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no.1 which is compulsory.

Q1 (a) Explain Chomsky's Hierarchy. (2.5)

(b) Explain Halting Problem. (2.5)

(c) What are the differences between DFA and NFA? (2.5)

(d) What is an ambiguous grammar? Give an example of such a grammar. (2.5)

(e) Is Non deterministic push down automata more powerful that non deterministic push down automata? Justify. (2.5)

(f) What is the full form of Class P and class NP? What is the relation between these two? (2.5)

(g) What do you mean by LL(k) grammar? Give example of such a grammar. (2.5)

(h) What do you understand by the statement," Problem P is reducible to problem Q". Explain the term Reducibility. (2.5)

(i) What is an alphabet? Give an example of an alphabet and also an example of a set which is not an alphabet. (2.5)

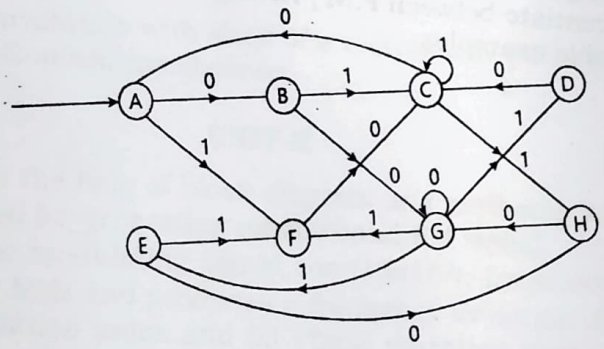
(j) Define Kleen closure. What is Kleen closure of an empty set? 2.5)

Q2 (a) Define a regular expression. Also write the regular expressions for the following languages. (6)

(i) The set of all strings ending in the substring '00' on $\Sigma=\{0, 1\}$.

(ii) $L = \{a^n b^m \mid n\geq 4, m\leq 3\}$.

(b) Consider the DFA given by the transition diagram: (6.5)



Draw the table of distinguishbilities for this automation. Construct the minimum sate equivalent DFA.

Q3 (a) State and prove pumping lemma for regular languages. Show that the language $L = \{a^n b^n \mid n \geq 0\}$ is not regular (6)

(b) Prove that every language defined by a regular expression is also defined by a finite automaion. (6.5)

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Q4 (a) Design a PDA for the language $= \{\omega\omega^{\wedge R} | \omega \in \{a, b\}\}$. Draw the transition diagram and also write the sequence of ID's for the string 'abba'. **(6)**

(b) What is an unit production? Begin with the grammar: $S \rightarrow ABC|BaB$

$A \rightarrow aA|BaC|aaa$

$B \rightarrow bBb|a|D$

$D \rightarrow \varepsilon$

Eliminate ε – productions
Eliminate any unit production in the resulting grammar
Eliminate any useless symbol in the resulting grammar. **(6.5)**

Q5 (a) Define CNF and convert the following grammar into CNF. **(6)**

$S \rightarrow Aba$

$A \rightarrow aab$

$B \rightarrow Ac$

(b) Prove that the family of context-free languages is closed under union, concentration and star-closure. **(6.5)**

Q6 Design a turning machine to accept the set of all palindromes over {0, 1}. Also, indicate the moves made by Turing machine for the string. **(12.5)**

Q7 Write short notes on following:- **(6.25x2=12.5)**
(a) Post Correspondence Problem.
(b) Multitape turing machine

Q8 (a) Differentiate between Recursive and Recursively enumerable languages **(6.5)**

(b) Differentiate between P,NP, NP hard and NP complete problems using suitable examples. **(6)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: IT-303 **Subject: Analog and Digital Communication**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q no.1 which is compulsory. Select one question from each unit.

Q1 (a) Find the Fourier transform of a periodic gate function with period T=1/2 and width τ=1/20. **(6.25)**

(b) Consider a FM broadcast signal which has been modulated by a single tone modulating signal of frequency f_m=15 KHz. The frequency deviation is the same as allowed by the international regulation. Find the significant sidebands and the bandwidth of the FM signal as a result of these sidebands. **(6.25)**

(c) Explain the process of QAM demodulation. **(6.25)**

(d) A continuous signal is band limited to 5 kHz. The signal is quantized in 8 levels of a PCM system with the probabilities 0.25, 0.2, 0.2, 0.1, 0.05, 0.05, and 0.05. Calculate the entropy and the rate of information. **(6.25)**

UNIT-I

Q2 (a) Write a note on suppressed carrier system (DSB-SC). Explain how baseband signal is recovered using synchronous detection? **(6)**

(b) In an AM-SC system, the modulating signal is a single-tone sinusoid $E_m Cosw_m t$ which modulates a carrier signal $E_c Cosw_c t$. Plot the spectrum of the modulates wave. **(6.5)**

Q3 (a) Explain with the help of block diagram generation and demodulation process of AM. **(6)**

(b) Find the convolution with itself of a rectangular pulse shown in Fig. 1 using Time-Convolution theorem. **(6.5)**

UNIT-II

Q4 (a) Explain with the help of block diagram and mathematical expressions to the method for generating narrowband FM signal. **(6)**

(b) A single-tone modulating signal cos ($15\pi 10^3 t$) frequency modulates a carrier of 10 MHz and produces a frequency deviation of 75 KHz. Find (i) the modulation index and (ii) Phase deviation produced in the FM waves. **(6.5)**

Q5 (a) Explain with the help of suitable block diagram and expression baseband binary PAM transmission system. **(6)**

(b) Find the minimum value of the average probability of error in optimum filter. **(6.5)**

UNIT-III

Q6 (a) Write a note on Delta modulation system. **(6)**

(b) Explain various elements of a PCM system. **(6.5)**

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Q7 (a) Explain with the help of block diagram coherent QPSK transmitter and receiver. **(6)**

(b) Write a note on ADPCM. **(6.5)**

UNIT-IV

Q8 For a (6,3) code the generator matrix is given below. The received word is 100011. Find the transmitted information word. **(12.5)**

$$G = \begin{bmatrix} 1 & 0 & 0:1 & 0 & 1 \\ 0 & 1 & 0:0 & 1 & 1 \\ 0 & 0 & 1:1 & 1 & 0 \end{bmatrix}$$

Q9 Consider a source with 7 messages having probabilities 0.25, 0.25, 0.125, 0.125, 0.125, 0.0625, 0.0625 respectively. Find entropy and efficiency using Huffman coding procedure. **(12.5)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH(CSE/IT)] NOVEMBER-DECEMBER 2018

Paper Code: IT-305 **Subject: Computer Architecture**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q.no.1 which is compulsory. Select one question from each unit.

Q1 Answer the following: **(10x2.5=25)**

(a) Explain unsigned numbers. Give its notation
(b) Explain IEEE 754 floating point standard.
(c) Mention any four functions of arithmetic logic shift unit.
(d) Explain the features of high speed memory.
(e) Give the standard of RS-422.
(f) Explain the role of strobe control and handshaking in asynchronous data transfer.
(g) Draw microprogrammed sequencer for control memory.
(h) Explain register organization and stack organization.
(i) Explain the features of first pass and second pass related to assembler.
(j) Explain various phases of instruction cycle.

UNIT-I

Q2 (a) Explain arithmetic and logic microoperation. Give an example for each. **(4)**

(b) Perform the subtraction for the following unsigned binary numbers by taking the 2's complement of the subtrahend: 11010 – 10000. **(4.5)**

(c) Explain the following for floating point representation: **(4)**
(i) mantissa
(ii) exponent
(iii) fraction
(iv) normalization

OR

Q3 (a) Explain three-state bus buffer. Give an example to illustrate bus and memory transfer instructions. **(2+2)**

(b) Starting from an initial value of R = 11011101, determine the sequence of binary values in *R* after a logical shift-left, followed by a circular shift-right, following by a logical shift-right and a circular shift-left. **(4)**

(c) Explain bus arbitration with an example. **(4.5)**

UNIT-II

Q4 (a) Draw the flow chart of interrupt cycle. **(4)**

(b) Mention the features of machine language and assembly language. **(4)**

(c) Explain timing and control with an example. **(4.5)**

OR

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Q5 (a) Give any two examples of register references instructions and memory reference instructions.

(b) Give the classification of 8085 instruction set. (4)

(c) A computer uses a memory unit with 256K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part. (4)

(i) How many bits are there in the operation code, the register code part, and the address part?

(ii) Draw the instruction word format and indicate the number of bits in each part.

(iii) How many bits are there in the data and address inputs of the memory?

UNIT-III

Q6 (a) Explain the design and implementation of simple CPU.

(b) Draw the architecture of 8085. (4)

(c) An instruction is stored at location 300 with its address field at location 301. The address field has the value 400. A processor register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is (a) relative, (b) register indirect and (c) index with R1 as the index register. (4)

OR

Q7 (a) Compare hardwired control and microprogramed control. Give their applications. (4.5)

(b) Explain address sequencing in microprogrammed control. Draw the block diagram of selection of address for control memory. (2.5)

(c) A computer has 16 registers, an ALU (arithmetic logic unit) with 32 operations, and a shifter with eight operations, all connected to a common bus system. (3+3)

(i) Formulate a control word for a microoperation.

(ii) Specify the number of bits in each field of the control word and give a general encoding scheme. (4)

UNIT-IV

Q8 (a) Explain the following modes of transfer:

(i) Programmed I/O

(ii) Interrupt-initiated I/O

(iii) Direct memory access (6)

(b) Explain the process of character-oriented and bit-oriented data transfer in serial communication. (3)

(c) Draw the block diagram of universal asynchronous receiver transmitter. (3.5)

OR

Q9 (a) Explain the process of address mapping using pages in virtual memory. Give an illustration. (4.5)

(b) An address space is specified by 24 bits and the corresponding memory space by 16bits. Answer the following: (3)

(i) How many words are there in the address space?

(ii) How many words are there in the memory space?

(c) Draw the block diagram of RAM and ROM chips. (5)

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FIFTH SEMESTER [B.TECH(CSE/IT)] NOVEMBER-DECEMBER 2018

Paper Code: IT-309 **Subject: Object Oriented Software Engineering**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q.no.1 which is compulsory.

Q1 Answer following in brief: **(Any Five)** **(5x5=25)**

(a) What is object orientation. How the objects & classes are identified in an object model?

(b) Write a note on inheritance & polymorphism.

(c) How object oriented system developments is carried out? Explain its phases.

(d) Differentiate between Association, Aggregation, Composition, Abstraction, Generalization, and Realization relationship. Differentiate between links and associations

(e) In UML class diagrams, what are Boundary Classes, Control Classes, and Entity Classes? Explain using suitable diagram.

(f) What is behavioral modeling? How constraints are handled in behavioral modeling?

(g) What is multiple inheritance. How it can it be shown using generalization?

Q2 **(6+6.5=12.5)**

(a) Enlist various building blocks of UML. What are the goals of UML? Discuss the advantages of using UML? In what sense UML is unified?

(b) Discuss different views supported by UML diagrams and explain the significance of Packages? Prepare an object and state transition diagrams for priority queues or heaps storing numbers, where in the operations of the shift up and shift down are possible.

Q3 **(6+6.5=12.5)**

(a) Write a note on Object Oriented Analysis. Briefly write the characteristics of Booch Method, the Coad and Yourdan method, Jacobson method and Raumbaugh method.

(b) Write a note on Object Oriented Design. Discuss the importance of system design? What are activities and actions in dynamic model?

Q4 **(6+6.5=12.5)**

(a) How the classes are identified in an object model? What is its significance? Draw a class diagram of the class student. Make necessary assumptions but clearly state them all. Clearly mark private, public and protected members.

(b) Explain the significance of object diagrams. What are the essential characteristics of object diagram? Create an object diagram for an employee by making some assumptions.

Q5 **(6+6.5=12.5)**

(a) What are abstract classes? How it is different from a normal class? What is their significance? What are static functions?

(b) What are components of use case model? Create a use case model for library management system. Explain 'Extends' relationship with suitable example.

Q6 **(6+6.5=12.5)**

(a) Describe the components of activity diagram. Draw a sequence diagram for a successful login into a system by a user. Describe the components of sequence diagram.

(b) Describe the components and uses of interaction diagrams.

Q7 **(6+6.5=12.5)**

(a) 'State diagrams depict the life cycle of an object' comment. Explain the need for deployment diagrams with suitable examples. What are collaboration diagrams?

(b) What are Components? How Components are organized? Explain the usage of component diagrams with suitable examples.

Q8 **(6.5+6=12.5)**

(a) Differentiate between testing and debugging? Explain the Testing Life Cycle. Write a note on Object Oriented testing strategies?

(b) Write a note on following testing in brief

- Black Box and White Box Testing
- Alpha and Beta Testing
- Stress Testing
- Regression Testing
- Performance Testing
- Acceptance Testing

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: IT-311 **Subject: Digital Design Using VHDL**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no.1 which is compulsory.

Q1 (a) Explain the behavioral and structural modeling in VHDL. (4)
(b) Define signal and variables. (4)
(c) Explain the use of generic statement in VHDL. (4)
(d) What is process statement in VHDL? Explain. (4)
(e) What are function and procedure in VHDL? Explain. (4)
(f) What is operator overloading in VHDL? Explain. (5)

Q2 (a) What are the different data types used in VHDL? Discuss. (6)
(b) Explain about different operator used in VHDL. (6.5)

Q3 Write a VHDL code for- (12.5)
(a) Full Adder
(b) 4x1 multiplexer
(c) BCD to 7segment decoder

Q4 Write the VHDL program for- (12.5)
(a) D-flip flop
(b) Synchronous counter
(c) 4 bit-Shift Register with PIPO

Q5 (a) Write VHDL for arithmetic logic unit. (6)
(b) What are concurrent and sequential statement in VHDL? Explain. (6.5)

Q6 (a) Explain the Moore and Mealy state models and give examples. (6)
(b) Write VHDL description of 4-bit carry look Ahead adder. (6.5)

Q7 (a) Explain the following terms:- (6)
(i) State Machine
(ii) State diagram
(iii) State table
(iv) State Assignment
(b) Write VHDL behavioral model for 32-bit adder. (6.5)

Q8 (a) Explain the inertial and transport delay model in VHDL. (6)
(b) Write the behavioral model for 4x4 binary multiplier. (6.5)

Q9 Explain the following:-
(a) ASM chart (6)
(b) SRAM design (6.5)

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