3E1651

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3E1651

B.Tech. III Semester (Main/Back) Examination Dec. - 2016

Information Technology

3IT1A Electronic Devices & Circuits

CS, IT

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

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

Unit - I

1. a) Find the probability to find an electron at energy level $\varepsilon = 1.8ev$ in silicon at room temperature. Assume the fermi level, $\varepsilon_F = 0.51ev$. Also find the probability of hole at same level. **(6)**

b) Discuss the factors on which depends the carrier generation and recombination in semiconductor. **(4)**

c) Design a clamping circuit using diode for clamp a input waveform $v_i = v_0 \sin \omega t$ at -2volt. **(6)**

OR

1. a) Find the contact potential between point 1 and 2 in a semiconductor sample shown in fig. - 1(a) **(6)**

1	Intrinsic	2
n-type si	si	n- type si
$N_D = 10^{18}/cm^3$		$N_D = 10^{13}/cm^3$

Fig. 1(a)

b) Design a clippling circuit using PN junction to achieve a output waveform as shown in fig. - 1(b)

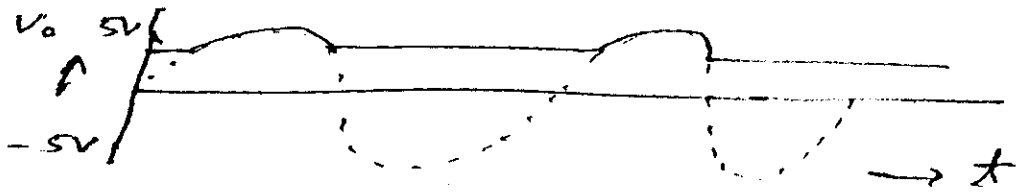


Fig- 1 (b)

Assume the input wavefrom is $v_i = 5\sin \omega t$ **(6)**

c) What is difference between Full wave and Half wave voltage multiplier? **(4)**

Unit - II

2. a) Find all junction voltage and terminal current in Fig. 2 (a). Assume $\alpha = 0.8$ *and* $I_{CBO} = 200$ *nano Amp.* **(8)**

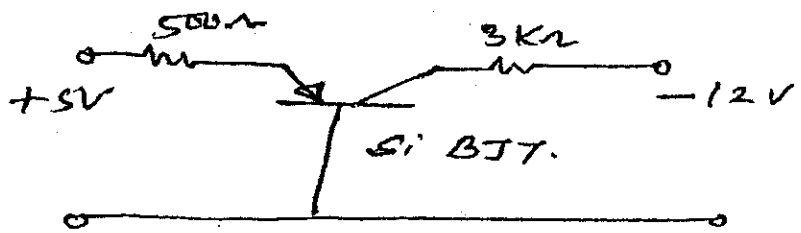


Fig- 2 (a).

b) What is difference between

i) Biasing and stabilization

ii) DC and AC analysis **(4+4=8)**

OR

2. a) How reverse saturation current I_{CBO} of collector junction depends on

i) Collector supply

ii) Junction temperature and

iii) Collector region doping.

Explain with Analytical discussion. **(2+3+3=8)**

b) Design a voltage divider bias circuit to establish a current $I_E = 1$mA using a power supply $v_{cc} = +12$Volt. Assume the nominal value of $\beta = 100$ **(6)**

c) What is condition for thermal stability? **(2)**

Unit - III

3. a) Find the expression for overall voltage and current gain for a CB-CC configuration. **(8)**

b) Determine the lower and higher Cutoff frequency f_L and f_H for a RC amplifier show in fig. - 3(b). Assume $C_K = 1000\,PF$ *and* $C_H = 10PF$. **(8)**

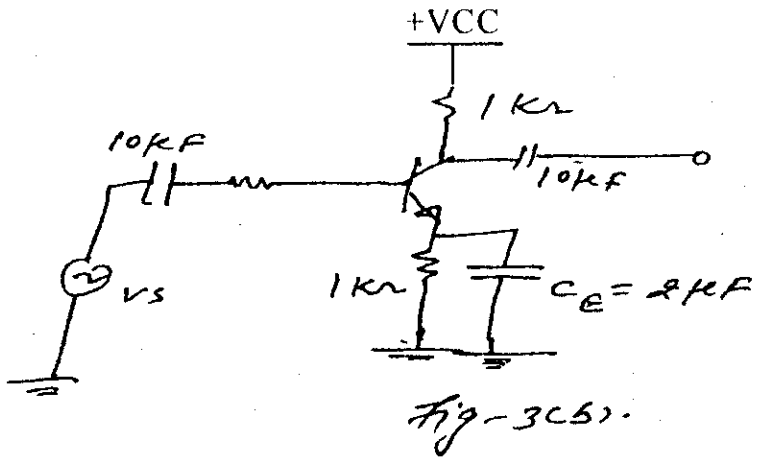


Fig-3(b).

OR

3. a) Find the overall voltage gain expression for a CS-CD double stage FET amplifier. **(8)**

b) Design a double stage CE-CE amplifier for achieve overall voltage gain 40dB. Assume the β of each transistor is 100. Neglect the source resistance. **(8)**

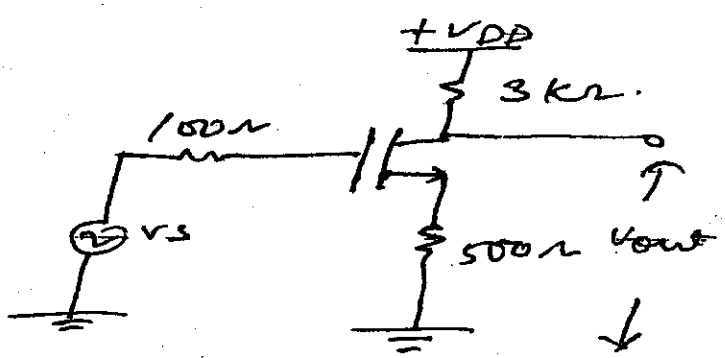
Unit - IV

4. a) Define the unit of

i) Feedback factor in voltage series Feedback.

ii) Feedback factor in current shunt Feedback. **(2×2=4)**

b) Find the value of feedback factor and its topology in fig. 4(b) **(6)**



c) Find the most appropriate Feedback in following condition.

	Source	**Load**
i)	Current source	low
ii)	Voltage source	High

(2×3=6)

OR

4. a) If the open circuit voltage gain of an amplifier is 1000 find the value of input and output resistance with feedback in following cases. Assume 10% output voltage is feedback.

i) $R_i = 100\Omega$, $R_0 = 10k\Omega$ feedback is voltage series.

ii) $R_i = 500\Omega$, $R_0 = 100k\Omega$ feedback is voltage shunt. **(4+4=8)**

b) Why feedback is used in amplifiers and oscillators? What difference between these two cases? **(4)**

c) If the fractional change in open circuit voltage gain is 50% with temperature then what would be the fractional change in voltage gain with feedback if 5% feedback is used. Assume the open circuit voltage gain $A_r = 500$. **(4)**

Unit - V

5. a) Design a wein bridge oscillator using

i) BJT as active element.

Let $\beta = 100$.

ii) Op-Amp as active element **(4+4=8)**

b) Explain the frequency division by bistable multivibrator **(4)**

c) Draw the Hystris curve of a schmitt trigger and define its LTP and VTP point. **(4)**

OR

5. a) Design a schmitt trigger such that its LTP and UTP are equal and equal to $\pm\frac{V_{DD}}{2}$ **(8)**

b) Design a colpitt oscillator for obtain oscillation frequency 10 MHz. Assume mutual inductance is Negligible. **(8)**

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b) Draw a 3 input ECL (Emitter - Coupled Logic) OR/NOR gate and explain it's working? **(8)**

Unit - III

3. a) Simplify the following using the tabulation method :

$F = \sum(1,2,3,7,8,9,10,11,14,15)$ **(8)**

b) A stair case light is controlled by two switches one at the top of the stairs and another at the bottom of stairs. Realize the circuit when the lamp (L) glows. **(8)**

OR

3. a) Compare k-map technique and quine - Mc cluskey minimization technique. **(8)**

b) Simplify the expression $F(A,B,C,D) = ACD + \overline{A}B + \overline{D}$ **(8)**

Unit - IV

4. a) Implement the following function using 4×1 multiplexer.

$f(A,B,C) = \sum m(0,1,4,7)$ use A and C as select lines. **(8)**

b) What are the use of multiplexers and demultiplexers. Explain the construction and working of a multiplexer circuit. **(8)**

OR

4. a) Draw gate level schematic of a 1-to-4 decoder as component realize a 1-to-16 decoder. **(8)**

b) Signals A,B,C,D and A are available. Using only one 8 to 1 MUX and no other gate, implement the expression.

$F(A,B,C,D) = BC + AB\overline{D} + \overline{A}\,\overline{C}D$ **(8)**

Unit - V

5. a) Draw a logic diagram of clocked S-R flip - flop and obtain its characteristic equation. Also show its excitation table. **(8)**

b) Write short note on the following :

a. Asynchronous and synchronous counter.

b. Sequential and non sequential counter. **(4×2)**

OR

5. a) Construct 4-bit serial adder using shift registers and logic gates. Explain its operation. **(8)**

b) Determine the next state for each of six unused states in the BCD ripple counter. Is the counter self - starting? **(8)**

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3E1653

B.Tech. III Semester (Main/Back) Examination Dec. - 2016

Applied Elect. & Inst. Engg

3AI4 Digital Electronics

EE, EX, EC, EI, CS, IT, AI

Time : 3 Hours **Marks : 80**

Min. Pass Marks : 26

Instructions to Candidates:

Attempt five questions. All questions carry equal marks. Make clear assumptions wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) For the integer with decimal representation 345 find the corresponding bit vectors for BCD code and for excess - 3 code. **(8)**

   b) Design a network using only XOR gates which performs the following function.

$$Z = \begin{cases} x_i & \text{if } C = 0 \\ x_i & \text{if } C = 1 \end{cases}$$ **(8)**

OR

1. a) What do you mean by sequential code, self complementing code, cyclic code and excess - 3 code? Give one example of each code. **(8)**

   b) Using the postulates of Boolean algebra and the theorems, prove the following:

   i. $a'b' + ab + a'b = a' + b$

   ii. $ab' + b'c' + a'c' = ab' + a'c'$ **(8)**

Unit - II

2. a) Discuss CMOS NAND and NOR gates. **(8)**

   b) Explain the working of CMOS inverter. **(8)**

OR

2. a) Draw a neat circuit of TTL (Transistor Transistor Logic) NAND gate with totem pole output and explain. **(8)**

Unit - III

3. What is doubly linked list? Explain the algorithms for inserting a node and deleting a node from a doubly linked list. **(16)**

OR

3. a) Explain polynomial representation using linked list with an example. **(8)**

   b) What is dequeue? Write down the algorithms for the insertion and deletion operations performed on dequeue. **(8)**

Unit - IV

4. a) Define Binary search tree. Write algorithm to implement insertion operation on Binary Search tree. **(8)**

   b) What is an AVL tree? Explain the rotations of AVL tree. **(8)**

OR

4. a) Explain an algorithm for postorder traversal of a binary tree. **(8)**

   b) What are the basic operations that can be performed on a binary tree? Explain each of them in detail with suitable example. **(8)**

Unit - V

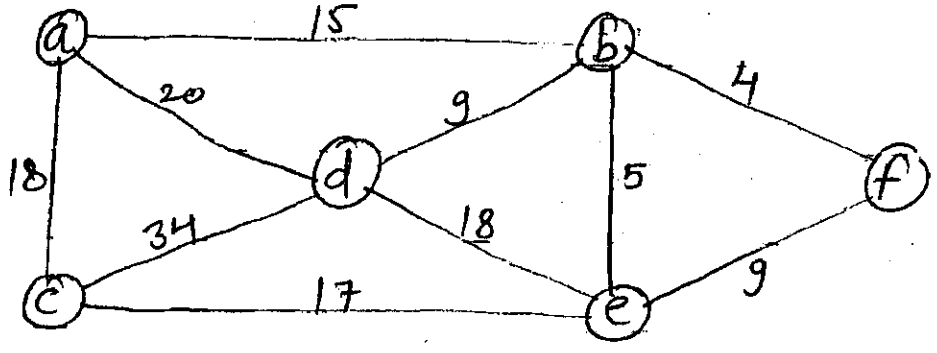
5. a) Write an algorithm for merge sort and comment on its complexity. **(8)**

   b) Sort the following data in ascending order using Quick sort :

   9, 4, 12, 6, 5, 10, 7. **(8)**

OR

5. a) Using Prim's and Kruskal's algorithm, find minimum spanning tree for the following graph : **(10)**



   b) Write an algorithm for DFS traversal. **(6)**

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3E1652/1612

B.Tech. IIISem.(Main/Back) Examination Dec. - 2016

Computer Science & Engineering.

3CS2A Data Structures and Algorithms

CS,IT,EX,EC, EI

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel inissing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) What are the differences between Big oh (O), omega (Ω) & theta (θ) notation? **(8)**

b) Calculate the address of element A[3][2] in a two dimensional array. A[3][3] stored in row major and column major order in the main memory. Assume the base address to be 100 and that each element requires 2 words of storage.**(8)**

OR

1. a) Why time and space complexity must be considered while writing a code?**(8)**

b) Explain the characteristics of an algorithm. **(8)**

Unit - II

2. a) What is STACK? Write algorithms to insert an element in STACK and delete an element from STACK with example. **(8)**

b) Convert following infix expression into portfix notation :

$A+B-(C+D)/E*F-(G+h)/I$ **(8)**

OR

2. a) Explain the implementation of queue with example. **(8)**

b) Write an algorithm to delete an element from a circular queue. **(8)**

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3E1654

B.Tech. III Semester (Main/Back) Examination, Dec.- 2016
Computer Sc. & Engg.
3CS5A Object Oriented Programming
EE,EX,CS,IT

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

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

Unit - I

1. a) What are the difference between homogeneous and heterogeneous data type? What are the features of structure? **(8)**

   b) Write any program to pass the structure to a function. Explain each and every step in detail. **(8)**

OR

1. Create a structure to specify data of customers, in a bank. The data to be stored is: Account number, Name, Balance in account. Assume maximum of 20 customers in the bank.

   a) Write a function to print the account number and name of each customer with balance below Rs. 100.

   b) If a customer request for withdrawal or deposit, it is given in the form :

   Acct. no, amount, code (1 for deposit, 0 for withdrawal) write a program to give a message, "The balance is insufficent for specified withdrawal". **(16)**

Unit - II

2. a) How do structures in C and C++ differ? **(8)**

   b) Explain container class and proxy classes in detail. **(8)**

OR

2. a) Describe the mechanism of accessing data members and member functions in the following case :

   i) Inside the main program.

   ii) Inside the member function of the same class. **(10)**

   b) What are object? How are they created? **(6)**

Unit - III

3. a) What is operator overloading? Why is it necessary to overload an operator? **(8)**

   b) Differentiate unary and binary operators. **(8)**

OR

3. a) What is an operator function? Describe the syntax of an operator function. **(8)**

   b) When is a friend function compulsory? Give an example with detail. **(8)**

Unit - IV

4. a) What is inheritance? What are the different types of inheritance? Give an example of each. **(10)**

   b) Explain the concept of base class and derived class. **(6)**

OR

4. a) When do we make a abstract class? Explain in detail. **(8)**

   b) Describe how an object of a class that contains object of other classes created? **(8)**

Unit - V

5. a) What is a virtual base class? Explain. **(8)**

   b) What are the difference between error and exception? Explain the keywords used in exception handling. **(8)**

OR

5. Write short note on : (any **two**)

i) Templates

ii) Pointer to classes

iii) Multiple inheritance.

3E1655

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3E1655

B.Tech. III Semester (Main/Back) Examination, Dec. - 2016
Computer Sc. & Engg.
3CS4A Fundamentals of Linux Shell Programming
CS, IT

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

Instructions to Candidates:

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

Unit - I

1. a) What is Linux? Explain the properties of Linux. **(8)**

   b) Explain the Access permissions in Linux. **(8)**

OR

1. Explain the following commands :

   i. chmod ii. cat

   iii. touch iv. kill **(4×4=16)**

Unit - II

2. a) Explain Yank and put command with an example **(8)**

   b) What is searching & submitting operation? **(8)**

OR

2. What is Vi editor? Explain the modes of Vi editor. Write down the features of Vi editor. **(16)**

Unit - III

3. a) Describe in details the Remote computing and Local Displays in X - window. **(10)**

   b) How can we customize the FVWM Window Manager. **(6)**

OR

3. Explain the X-Applications in details. **(16)**

Unit - IV

4. a) Explain standard stream with examples. **(8)**

   b) Explain command separation & grouping in details. **(8)**

OR

4. a) Define command line editing in shell. **(8)**

   b) Explain the used processes in shell. **(8)**

Unit - V

5. Explain Shell Builtin commands in details. **(16)**

OR

5. a) What is the difference between RCS and CVS? **(8)**

   b) Explain functions in shell programming. **(8)**

3E1656

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3E1656

B.Tech. III Semester (Main/Back) Examination Dec.- 2016
Computer Sc. & Engg.
3CS6A Advanced Engg. Mathematics - I
CS,IT

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

Instructions to Candidates:

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

Unit - I

1. a) Explain Engineering application of optimization Techniques. **(8)**

   b) Find the extreme point of the function.

   $$f(x_1, x_2) = x_1^3 + x_2^3 + 9x_1^2 + 18x_2^2 + 144$$ **(8)**

OR

1. a) A rectangular sheet of metal of sides a and b has four equal square portions removed at the corners and the sides are then turned up so as to form an open rectangular box. Find the depth of the box when the volume of the box is maximum. **(8)**

   b) Maximize $z = 6x_1 + 8x_2 - x_1^2 - x_2^2$

   $$\text{s.t} \quad 4x_1 + 3x_2 = 16$$
   $$3x_1 + 5x_2 = 15, \quad x_1, x_2 \geq 0$$ **(8)**

Unit - II

2. a) Solve the following pinear programming problem by graphical method.

Min $z = 2x_1 + 3x_2$

s.t $x_1 + x_2 \le 4$ **(8)**

$6x_1 + 2x_2 \ge 8$

$x_1 + 5x_2 \ge 4$

$x_1 \le 3$

$x_2 \le 3$

$x_1, x_2 \ge 0$

b) ing transportatic problem to maximize the profit **(8)**

To		Destination			Suply
			3	4	
			100	110	200
			130	85	100
Demand	75	100	100	30	300
					305

OR

2. a) Solve the following LPP **(8)**

Maximize $z = -4x_1 - 3x_2 - 9x_3$

s.t $2x_1 + 4x_2 + 6x_3 \ge 15$

$6x_1 + x_2 + 6x_3 \ge 12$

$x_1, x_2, x_3 \ge 0$

b) Write the dual of the linear programming problem

Maximize $z = x_1 - 2x_2 + 3x_3$

s.t. $2x_1 + 5x_3 \le 16$

$5x_2 + 4x_3 \ge 18$

$x_1 + x_2 + x_3 = 10$

$x_1 \ge 0$, $x_2 \le 0$, x_3 unrestricted in sign **(8)**

Unit - III

3. a) Define the following : **(8)**

i. Jacobi symbol

ii. Sieve of Eratosthenes

b) State and prove the chinese Remainder Theorem. **(8)**

OR

3. a) Suppose n is a positive integer and k is relatively prime to n then : $k^{\phi(n)} \equiv 1 (\text{mod } n)$ **(8)**

b) If $\{G,*\}$ is a finite cyclic group generated by on element $a \in G$ and is of order n, then $a^n = e$ so that $G = \{a, a^2, ..., a^n (= e)\}$. Also n is the least positive integer for which $a^n = e$ **(8)**

Unit - IV

4. a) Obtain the Laplace transform of

$$f(t) = \frac{1 - \cos t}{t^2}$$ **(8)**

b) Use Laplace transform to solve the following differential equations

$$(D^2 + 1)x = t \cos 2t, x(0) = 0, x'(0) = 0$$ **(8)**

OR

4. a) Use convolution theorem to evaluate

$$L^{-1}\left\{\frac{s}{(s^2 + a^2)^2}\right\}$$ **(8)**

b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with the boundary conditions

$u(x,0) = 3 \sin 2\pi x$

$u(0,t) = 0$

$u(1,t) = 0 \quad where\ 0 < x < 1, t > 0$ **(8)**

Unit - V

5. a) Use stirling formula to find f(11), given that **(8)**

x :	2	6	10	14	18
y :	21.857	21.025	20.132	19.145	18.057

b) Use picards methods to solve

$\frac{dy}{dx} = 1 + xy$ given that y(0) = 1

Tabulated y(0.1), y(0.2) **(8)**

OR

5. a) Use Lagrange's interpolation formula to find the value of x when y = 15 if the following value of x and y are given **(8)**

x:	5	6	9	14
y :	12	13	14	16

b) Apply Runge - Kutta Fourth order method to find an approximate value of y when x = 0.2 given that **(8)**

$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1