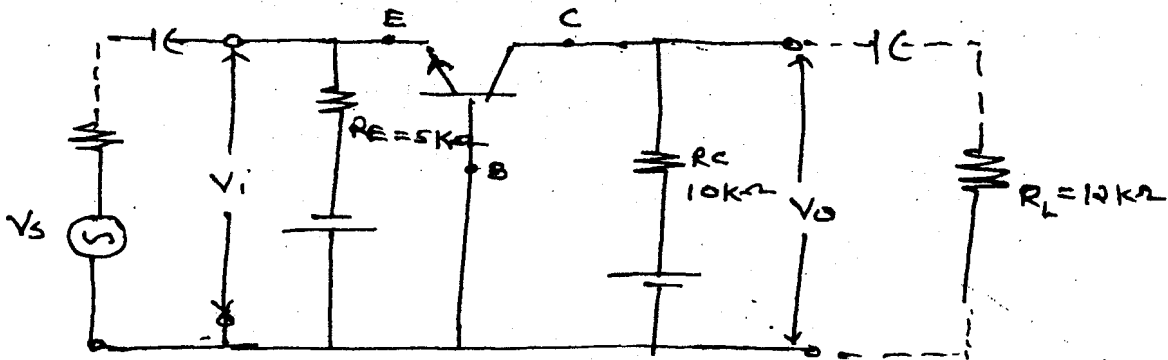


(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Solve any **four** questions from remaining **six** questions.
 (3) Assume **suitable** data wherever **necessary**.

1. (a) For the common base circuit in **Figure 1** the transistor parameters are $h_{ib} = 22 \Omega$, 15
 $h_{rb} = -0.98$ $h_{ob} = 0.49 \mu A/v$ $h_{fb} = 2.9 \times 10^{-4}$. Calculate the values of the input
 resistance, output resistance, current gain and voltage gain for the given circuit.



- (b) Write a note on current mirror circuit. 5
2. (a) Show the use of OPAMP as an instrumentation amplifier. Derive the expression for gain of an instrumentation amplifier. 10
 (b) How will you use OPAMP as on Schmitt trigger? 10
3. (a) Draw and explain internal architecture of Timer IC 555. 10
 (b) Design voltage regulator using IC 723 for $V_o = 10V$ $V_i = 12 \pm 10\%$ $I_L \text{ max} = 70 \text{ mA}$. 10
 How will you boost the current to a level of 1Amp.
4. (a) Design rectangular wave generator using IC 741 for following specifications 10
 $V_o = \pm 10V$
 Frequency = 10 KHz duty cycle = 60%.
 (b) Design Wienbridge oscillator for a frequency of 1 KHz. 10
5. (a) Design astable multivibrator using IC 555 for a frequency of 1KHz duty cycle = 60%, what modification you will do for duty cycle of 50%. 10
 (b) Explain in detail second order low pass filter. 10

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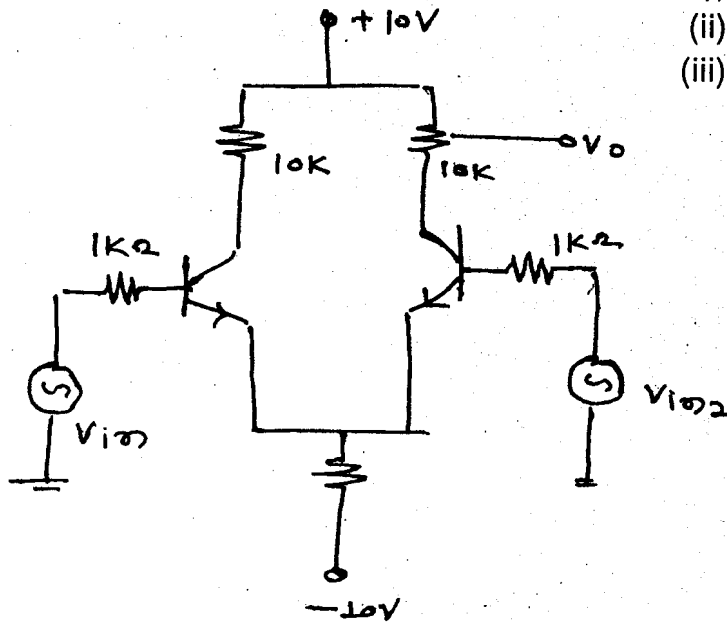
6. (a) For OPAMP explain following terms and give practical values :—

10

- (i) SVRR
- (ii) Slew rate
- (iii) CMRR.

(b) The specifications for the differential amplifier is given below. Determine the following :—

- (i) DC Bias Q point
- (ii) Voltage gain A_d
- (iii) Voltage gain A_c



Transistor data

$$h_{ie} = 1k\Omega \quad h_{fe} = 100$$

(neglect h_{oe} and h_{re})

$$V_{BE} = 0.6.$$

7. Write short notes on any **two** of the following :—

20

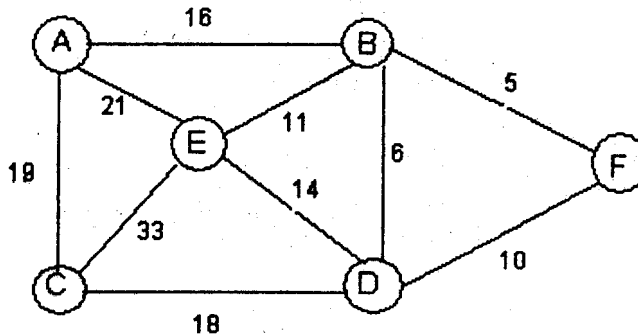
- (a) Stability factor of biasing circuit.
- (b) Successive approximation type ADC
- (c) Practical integrator and differentiator
- (d) Use of Timer as Frequency divider.

- N.B.
- 1) Question No. 1 is compulsory.
 - 2) Attempt any **four** questions out of remaining **six** questions.
 - 3) Assumption made should be **clearly** stated.
 - 4) **Figures** to the **right** indicate marks for **each** question.
 - 5) Assume **suitable** data wherever **required**.

- Q. 1 (a) What is Data Structure and Abstract Data Type? (05)
- (b) Explain the Asymptotic notations to measure the time complexity of Algorithm (05)
- (c) What is Recursion? State its advantages and Disadvantages. (05)
- (d) What is a Vector? Explain any four functions. (05)
- Q. 2 (a) Write an ADT for Stack. And implement it using array. The ADT should support the following operations. (10)
- i) Create ii) Push iii) Pop iv) Display
- (b) Write an algorithm to implement Quick sort? Derive its Best case and Worst case Time complexity. (10)
- Q. 3 (a) What is a Priority Queue? Explain the Insertion and Deletion operations on Priority Queue if it is implemented using Array. (10)
- (b) Explain the working of Merge sort. And sort the following elements (10)
- 70, 20, 30, 40, 10, 50, 60
- Q. 4 (a) Define Binary Tree. Write an algorithm to implement different tree traversal techniques. (10)
- (b) What is a Doubly Linked List? Write a program to implement the following operations on it. (10)
- i) Insert ii) Delete iii) Traverse
- Q. 5 (a) What is an AVL tree? Construct the AVL tree for the following set of data. (10)
- 14, 10, 1, 20, 17, 24, 18, 12, 15, 11, 4, 6
- (b) Explain the Huffman's Algorithm for encoding the characters. And construct the Huffman's code for following characters. (10)

Alphabets	C	E	F	D	A	B
Frequencies	12	9	5	16	45	13

- Q. 6 (a) Using Prim's and Kruskal's algorithm find Minimum Spanning tree for the following graph. (10)



- (b) What do you mean by Hashing and Collision. How do you resolve the Hash clashes. (10)

- Q. 7 Write short note on (Any four) (20)
- i) MAP abstract Data Type.
 - ii) Splay Tree.
 - iii) Pattern Matching.
 - iv) Graph Traversal.
 - v) Expression Tree.
-

Con. 3836-11.

RK-4953

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.(2) Answer any **four** questions from question nos. 2 to 7.

1. (a) What do you mean by Quality of information. 5
 (b) What do you mean by software quality assurance ? 5
 (c) What is GIS ? 5
 (d) What is World Wide Web ? 5
 2. (a) What is meant by digital computer ? Draw a Schematic to show various functional units of a digital computer. 10
 (b) What are Application programs ? What are differences between application program and system program ? Cite any two examples of each. 10
 3. (a) What do you mean by Memory Devices ? Explain the differences between the Primary and Secondary memory. 10
 (b) What are software development life cycle models ? 10
 4. (a) What is meant by communication channel ? Explain different types of communication channels. 10
 (b) What do you mean by client server model ? 5
 (c) What do you understand by communication protocols ? 5
 5. (a) Explain TCP/IP protocol. 10
 (b) What is the Internet / List the important usage of Internet ? 5
 (c) What are IP addresses ? 5
 6. (a) What is data warehousing ? 5
 (b) What are the advantages of e-commerce ? 5
 (c) Explain various threats to Electronic Commerce system. 5
 (d) What is Firewall ? What are the advantages of firewall ? 5
 7. Write notes on the following :—
 (a) Routers 5
 (b) Computer Classification 5
 (c) Wireless Application Protocols 5
 (d) Categories of e-commerce. 5
-

2/6/2011

S.E IT III (Rev)
Digital Logic Design Application

ws Scan Paper -2 100

Con. 3116-11.

RK-1329

(3 Hours)

[Total Marks : 100

N.B. : 1) Q.1 is Compulsory.

2) Attempt any Four out of the remaining Questions.

3) Figures to the right indicate full marks.

4) Assume suitable data whenever necessary.

1. (a) Convert $(214.32)_9$ to BCD , Excess-3, Gray Code and Base 7 5

(b) Give one application of Gray code, Why it is called as self reflecting codes? 5

(c) Justify, NOR gate is a Universal Logic Gate 5

(d) Design a Full Subtractor Using suitable Decoder 5

2. (a) Simplify the Logic Expression and draw the logic diagram for the following 12

i) $A + \overline{AB} + \overline{AB} + C + ABCD$

ii) $\overline{W}Y + \overline{\overline{W}XZ} + \overline{W}X\overline{Y}Z + W\overline{X}Y$

iii) $\overline{XYZ} + X\overline{YZ} + XY\overline{Z} + XYZ$

(b) Perform the operations without converting the base 8

i) $(ABC)_{16} * (25)_{16}$

ii) $(33)_8 - (77)_8$

iii) $(F2F.7)_H - (753..A1)_H$

3.(a) Design a two bit Magnitude Comparator circuit using Gates 10

(b) Minimize using Quine Mc Cluskey's Method . 10

$$F(A, B, C, D) = \sum m (1, 5, 7, 13, 14, 15, 17, 18, 21, 22, 25, 29) + d (6, 9, 19, 23, 30).$$

[TURN OVER

4. (a) Implement the following expression using only one 4:1 MUX and few logic gates 10

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 6, 7, 9, 10, 13, 15)$$

(b) A car manufacturing company wants to design a logic circuit to allow the car to start only on the following conditions: 10

i) Only when the driver and front seat co-passenger are sitting with their seat belt on

ii) If no passenger is sitting and only the driver is sitting with the seat belt on

Design and realize the circuit using Logic gates

5. (a) How T Flip Flop is derived from JK Flip Flop. Explain the working for both. 10

(b) Convert :

i) JK to D F/F

ii) SR to T F/F

6) (a) Design a mod 6 Up/ Down ripple counter using JK flip flops 10

(b) Design a circuit to generate the following 10.

..... 11001, 11001, 11001,

7) Write short notes on any three of the following 20

a) VHDL features

b) PAL and PLA

c) Octal to Binary encoder

d) Look ahead carry Generator

e) ALU features

7/6/2011

S.E IT III

GUI & Database Management

wa Scan Paper -2 104

Con. 3120-11.

RK-1323

(3 Hours)

[Total Marks : 100

N.B. : 1) Question No 1 is Compulsory.

2) Attempt any four questions from Q. No 2 to 7.

3) Use diagrams wherever necessary.

4) Assume suitable data wherever required but justify the same.

1. (a) Explain Murphy's law of GUI design and features of GUI. 05
- (b) Compare RDBMS, OODBMS, ORDBMS. 05
- (c) Define i) Tuple ii) Degree iii) Domain 05
- (d) Write note on Icon and Graphics. 05
2. (a) What do mean by E-R diagram? Draw E-R diagram for university database
Consisting of four entities: **Student, Department, Class, Faculty**. 10
- Student has a unique id, the student can enroll for multiple classes and has at most one major.
 - Faculty must belong to department and faculty can teach multiple classes.
 - Each class is taught by only one faculty.
 - Every student will get grade for the class he/she has enrolled.
- (b) What is Transaction? Discuss state transition diagram and properties of transaction. 10
3. (a) Explain time-stamp ordering protocol and Thoma's Write Rule. 10
- (b) Explain following relational algebra operators with example: 10
- i) Rename ii) Set-difference iii) Outer join
4. (a) Write short notes on: 10
- ODBC
 - OLE DB
- (b) List the ACID properties. Explain the usefulness of each. 10

[TURN OVER

- 5 (a) Explain in detail inbuilt control and Active-X control in VB. 10
- (b) What is effect of deadlock? How it is detected? Discuss different types of deadlock avoidance scheme. 10
- 6 (a) Describe the use of logs and check points in a database . 10
- (b) Define following terms with examples 10
i) Super key ii) Candidate Key iii) Primary key iv) foreign key
- 7 (a) Explain deferred database modification and immediate database modification and their difference in the context of recovery. 10
- (b) What is SQL? Explain the following structures of SQL queries with appropriate example : 10
i) Select clause ii) Where clause iii) From clause

iv) Aggregate function v) With clause
-

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Figures to the right indicate full marks.

1. (a) Solve the equation — 5

$$y + \int_0^t y dt = 1 - e^{-t}.$$

- (b) Find Fourier Expansion for $f(x) = x - x^2$, $-1 < x < 1$. 5

- (c) Verify Laplace's equation for $u = \left(r + \frac{a^2}{r}\right) \cos \theta$. Also find v and $f(z)$. 5

- (d) Find the rank of the matrix— 5

$$A = \begin{bmatrix} 1 & 3 & 2 & 1 \\ 2 & 3 & 3 & 2 \\ 3 & 4 & -1 & 3 \\ 6 & 10 & 4 & 6 \end{bmatrix}.$$

2. (a) Find the Fourier Expansion of $f(x) = x + x^2$ when $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$. 8
 Hence deduce that —

(i) $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$

(ii) $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$

- (b) Using Convolution Theorem, find — 6

$$L^{-1} \left[\frac{1}{(s-a)(s+a)^2} \right].$$

- (c) Show that the function $f(z) = |z|^2$ is differentiable but not analytic at the origin. 6

3. (a) Show that the following system of equations is consistent if a, b, c are in A.P. $3x + 4y + 5z = a, 4x + 5y + 6z = b, 5x + 6y + 7z = c$. Find the solution when $a = 1, b = 2, c = 3$. 8

(b) Obtain Taylor's Expansion of $f(z) = \frac{1-z}{z^2}$ in powers of $(z-1)$. 6

(c) Express the following function in terms of the unit step function and hence obtain Laplace Transform :— 6

$$f(t) = \begin{cases} 2t & \text{for } 0 < t < \pi \\ 1 & \text{for } t > \pi. \end{cases}$$

4. (a) Find — 8

(i) $L[\operatorname{erf}_c \sqrt{t}]$, (ii) $L\left[\frac{\sin^2 2t}{t}\right]$, (iii) $L[\sin^5 t]$.

(b) Find the inverse of $\begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$ by elementary transformations. 6

(c) Evaluate $\int_C (z - z^2) dz$ where C is the upper half of the circle $|z| = 1$. What is the value of the integral for the lower half of the same circle? 6

[TURN OVER

5. (a) Show that the set of functions — 8

$$1, \sin \frac{\pi x}{L}, \cos \frac{\pi x}{L}, \sin \frac{2\pi x}{L}, \cos \frac{2\pi x}{L}, \dots$$

form an orthogonal set in $(-L, L)$ and construct an orthonormal set.

(b) Find the residue of $f(z) = \frac{z}{\cos z - \cosh z}$ at its singularities using Laurent's series expansion. 6

(c) Prove that $\int_0^{\infty} \left(\frac{\sin 2t + \sin 3t}{t^{5/2}} \right) dt = \frac{3\pi}{4}$. 6

6. (a) Find — 8

(i) $L^{-1} \left(\frac{2s}{s^4 + 4} \right)$,

(ii) $L^{-1} \left(\frac{4s + 12}{s^2 + 8s + 12} \right)$,

(iii) Find $L^{-1} \left\{ \log \left[\frac{s^2 + a^2}{\sqrt{s + b}} \right] \right\}$.

(b) If A is non-singular matrix of order n prove that — 6

(i) $|\text{adj } A| = |A|^{n-1}$

(ii) $\text{adj}(\text{adj } A) = |A|^{n-2} A$.

(c) If $w = f(z)$, then prove that $\frac{dw}{dz} = (\cos \theta - i \sin \theta) \frac{dw}{dr}$. 6

7. (a) Expand $f(x) = \begin{cases} kx, & 0 < x < \frac{l}{2} \\ 0, & \frac{l}{2} < x < l \end{cases}$ into half range cosine series. Deduce the sum 8

of the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$.

(b) Find $\text{adj}(\text{adj } A)$ for the matrix — 6

$$A = \frac{1}{9} \begin{bmatrix} -1 & -8 & 4 \\ -4 & 4 & 7 \\ -8 & -1 & -4 \end{bmatrix}$$

(c) Find the angle of intersection of the curves $r = \sin \theta + \cos \theta$ and $r = 2 \sin \theta$. 6