

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Solve any **four** questions out of remaining **six** questions.

1. (a) Discuss the main categories of data models. 5  
(b) State five main advantages of using a DBMS. 5  
(c) Explain ACID properties of transactions. 5  
(d) Explain with examples the decision making statements and loop structures statements in VB. 5
2. (a) What are the different types of database system users ? 5  
(b) List the functions of a database administrator (DBA). 5  
(c) Draw an E-R diagram which models an online bookstore. List entity sets and primary keys. 10
3. (a) What are the conditions for the schedules S & S' to be view equivalent ? When do we say a schedule S is view serializable ? 10  
(b) Why transaction processing systems usually allow concurrent executions ? Give reasons. 10
4. (a) Brief about validation based concurrency control scheme. 10  
(b) Explain deadlock prevention in detail. 10
5. (a) For the following relations for a book club :- 10  
(i) Members (Member-id, Name, Designation, Age).  
(ii) Books (Bid, Btitle, BAuthor, Bpublisher, Bprice).  
(iii) Reserves (Member-id, Bid, Date)  
where Bid, Btitle, BAuthor, Bpublisher and Bprice are book identification, booktitle, book author, book publisher and book price respectively.  
Write the following queries in SQL.339  
(1) Find the names of members who are professors older than 45 years.  
(2) List the titles of books reserved by professors.  
(3) Find IDs of members who have reserved books that cost more than Rs. 500.  
(4) Find the authors and titles of books reserved on 11-11-2011.  
(5) Find the names of members who have reserved all books.  
(b) Describe two-phase locking protocols and graph based protocols. 10
6. (a) Write a note on relational algebra. 10  
(b) Describe the use of logs and check points in a database. 10
7. Write short notes on (any four) :- 20  
(a) DDL and DML  
(b) Transaction support in SQL  
(c) Features of GUI  
(d) Activex data objects (ADO)  
(e) Extended E-R features  
(f) Shadow paging recovery technique.

7/12/11

SE IT sem III (R.)

V-2nd-HF-Ex-11-C-89

Electronics Devices & Linear Circuits

MP-4177

Con. 6265-11.

(3 Hours)

[Total Marks : 100

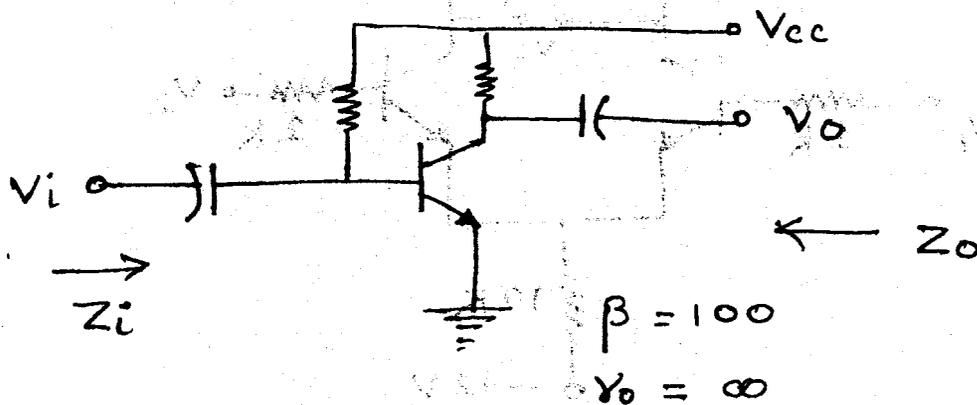
N.B. : (1) Question No. 1 is compulsory.

(2) Solve any four questions from remaining six questions.

(3) Assume the suitable data wherever necessary.

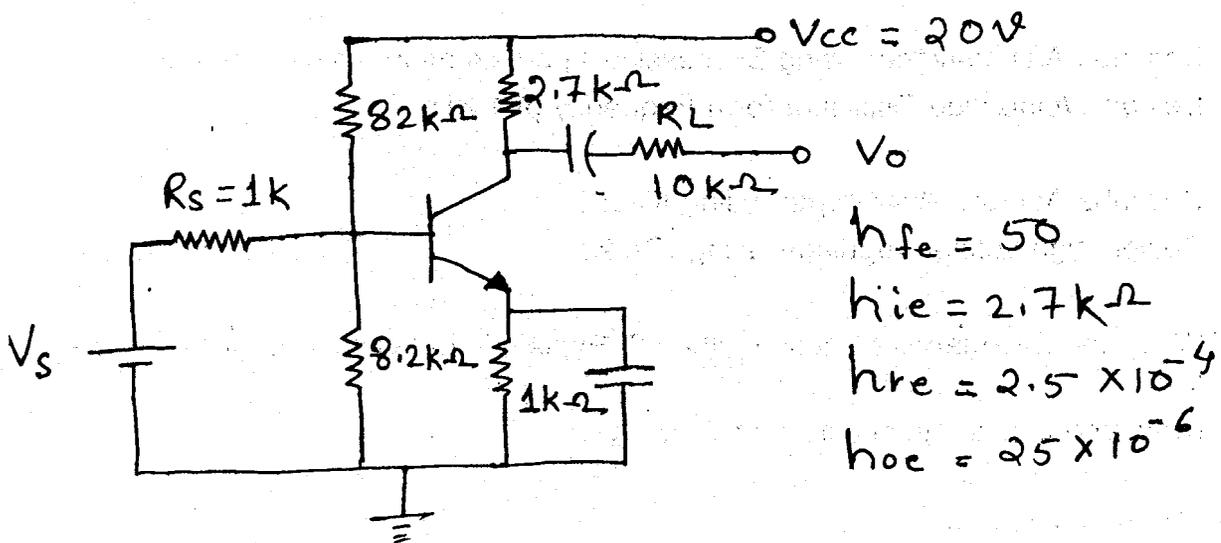
1. (a) Derive the equations for  $z_i$ ,  $z_o$ ,  $A_v$  and  $A_i$  for the circuit shown below :—

10



(b) Determine  $z_i$ ,  $z_o$ ,  $A_v$  and  $A_i$  for the circuit shown below :—

10



2. (a) Explain the working of 3-OPAMP instrumentation amplifier. Derive the expression for output voltage.

10

(b) (i) Describe Summing Amplifier.

5

(ii) Describe Zero Crossing Detector.

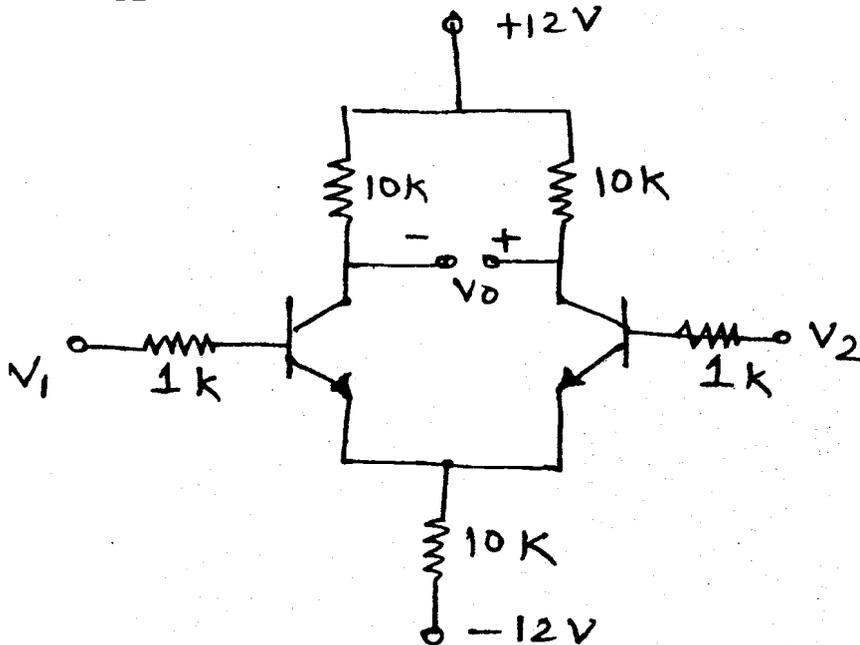
5

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Con. 6265-MP-4177-11.

2

3. (a) For the differential amplifier, determine  $I_{CQ}$ ,  $V_{CEQ}$ ,  $A_d$ ,  $A_c$ , CMRR if  $h_{ie} = 1\text{ k}$  and  $h_{fe} = 100$ ,  $V_{BE} = 0.6\text{ V}$ . 10



- (b) Draw the circuit diagram and explain the operation of Integrator. What are the limitations of basic circuit? How they are overcome in practical circuit? 10
4. (a) Describe A/D converter using Successive Approximation resistor method. 10  
 (b) Design Weinbridge Oscillator for a frequency of 1 KHz. 10
5. (a) Describe Astable Multivibrator using IC-555. 10  
 (b) Design high voltage regulator using IC-723. 10
6. (a) What are advantages of Active Filters? Explain in detail second order low pass filter. 10  
 (b) Draw and explain architecture of Timer IC-555. 10
7. Write short notes on :— 20  
 (a) Current Mirror Circuit.  
 (b) Timer as Frequency Divider.  
 (c) Stability factor of biasing circuit.  
 (d) RC phase shift oscillator.

1/12/2011

SE Sem III (IT)  
maths - III

PR-Oct. (1) 134

Con.6252-11.

MP-4186

(3 Hours)

[Total Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** out of **six** questions.

(3) **Figures** to the **right** indicate **full** marks.

(4) Make **suitable** assumptions if **required** and **justify** the same.

1. (a) Express the following matrix as the sum of symmetric and skew symmetric matrices where— 5

$$A = \begin{bmatrix} 2a & 3b & 2c \\ -b & c & 3a \\ 3c & 3a & 2b \end{bmatrix}$$

- (b) Obtain the Fourier series for the function. 5

$$f(x) = 2x - 1 \text{ in } 0 < x < 3$$

- (c) Evaluate  $\int_0^{\infty} \frac{\cos 6t - \cos 4t}{t} dt$  5

- (d) If  $f(z) = u + iv$  is an analytic function of  $z = x + iy$  and  $u + v = \cos x \cosh y - \sin x \sin h y$  find  $f(z)$  in terms of  $z$ . 5

2. (a) Find (i)  $L \left[ \sinh \frac{t}{2} \sin \left( \frac{\sqrt{3} t}{2} \right) \right]$  6

(ii)  $L \left[ (t + \sin 2t)^2 \right]$

- (b) Reduce to normal form and find the rank of the matrix 6

$$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

- (c) Find Fourier series for  $f(x)$  in  $(0, 2\pi)$  where 8

$$f(x) = \begin{cases} x & 0 < x \leq \pi \\ 2\pi - x & \pi \leq x < 2\pi \end{cases}$$

Hence deduce that

$$\frac{\pi^2}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} \dots$$

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3. (a) Construct an analytic function  $f(z)$  if its real part is—

$$\frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$$

(b) If  $A = \begin{bmatrix} 3 & 2 & 2 \\ 1 & 3 & 1 \\ 5 & 3 & 4 \end{bmatrix}$

find  $\text{adj } A$ ,  $A^{-1}$  and also find  $B$  such that—

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

- (c) Find

(i)  $L^{-1} \left[ \tan^{-1} \left( \frac{2}{s} \right) \right]$

(ii)  $L^{-1} \left[ \frac{1}{(s+3)(s^2+2s+2)} \right]$  using

Convolution theorem.

4. (a) Obtain Taylor's and Laurent's expansion of —

$$f(z) = \frac{z-1}{z^2-2z-3}$$

indicating regions of convergence.

- (b) Find the half range sine series for the function

$$f(x) = \frac{2kx}{l} \quad 0 \leq x \leq \frac{l}{2}$$

$$= \frac{2k}{l}(l-x) \quad \frac{l}{2} \leq x \leq l$$

- (c) Find the Laplace Transform of the following function

(i)  $(1+2t - 3t^2 + 4t^3) H(t-2)$

(ii)  $\cosh t \int_0^t e^x \sinh x \, dx$

5. (a) Evaluate  $\oint_C \frac{z-3}{z^2+2z+5} dz$  where

- $C$  is the circle
- (i)  $|z| = 1$
- (ii)  $|z+1-i| = 2$
- (iii)  $|z+1+i| = 2$

- (b) Find non singular matrices P and Q such that PAQ is in the normal form. Hence find the rank of A where— 6

$$A = \begin{bmatrix} 2 & 1 & 4 & 3 \\ 1 & 0 & 2 & 2 \\ 4 & 1 & 9 & 7 \end{bmatrix}$$

- (c) Solve  $y'' + 2y' + 5y = e^{-t} \sin t$  where  $y(0) = 0$ ,  $y'(0) = 1$  8

6. (a) Evaluate  $\int_0^{1+i} (x^2 + iy) dz$  6

along the path (i)  $y = x$   
(ii)  $y = x^2$ .

- (b) Use Residue theorem to evaluate 6

$$\oint_C \frac{z^2}{(z-1)^2(z+2)} dz \quad \text{where } C \text{ is } |z| = 3$$

- (c) Investigate for what values of a, b the following equations 8

$$\begin{aligned} x + 2y + 3z &= 4 \\ x + 3y + 4z &= 5 \\ x + 3y + az &= b \quad \text{have} \end{aligned}$$

- (i) no solution  
(ii) a unique solution  
(iii) an infinite no. of solutions.

7. (a) Show that the set  $S = \{ \sin x, \sin 3x, \sin 5x, \dots \}$  6

is orthogonal over  $\left[ 0, \frac{\pi}{2} \right]$ .

Find the corresponding orthonormal set.

- (b) Find the Fourier series for  $f(x)$  given by 6

$$\begin{aligned} f(x) &= 1 + \frac{2x}{\pi} \quad -\pi < x < 0 \\ &= 1 - \frac{2x}{\pi} \quad 0 < x < \pi \end{aligned}$$

Hence deduce that-

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

- (c) (i) If u and v are conjugate harmonic functions prove that uv is also harmonic 4  
(ii) Find the Laplace transform 4

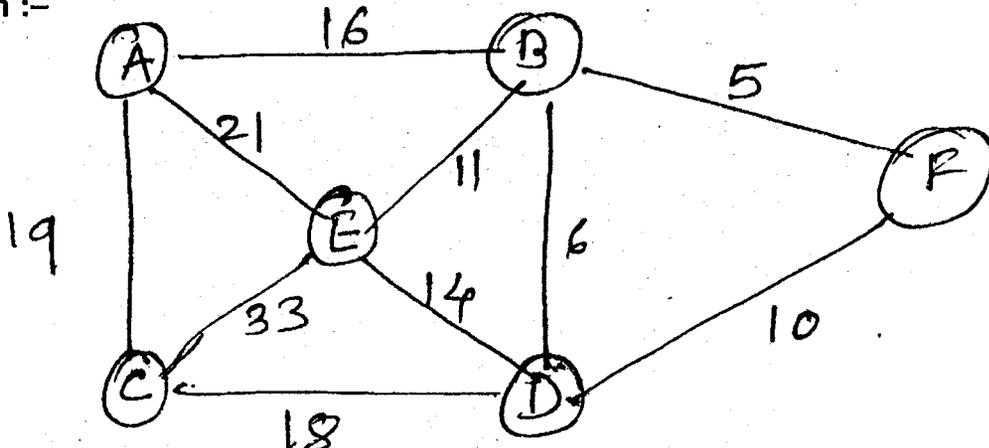
$$\frac{d}{dt} \left( \frac{1 - \cos 2t}{t} \right)$$

( 3 Hours )

[ Total Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** questions from remaining **six** questions.

1. (a) Explain the Asymptotic notations to measure the time complexity of algorithm. 5  
 (b) What are linear and non-linear data structures ? 5  
 (c) Explain vectors with at least five methods. 5  
 (d) Discuss circular and priority Queue. 5
  
2. (a) Write a program to create 'QUEUE' ADT using Linked list implementation. ADT should support following operations :- 10  
 (i) Create queue  
 (ii) Enqueue  
 (iii) Dqueue  
 (iv) Display.  
 (b) Explain Huffman Coding Algorithm with example. 10
  
3. (a) Write a program to implement Quick Sort and comment on its complexity. 10  
 (b) Implement the function to delete a node from Binary search tree. (consider all possible cases). 10
  
4. (a) Write a program to create Binary tree and inorder, preorder and postorder traversal of the tree. 10  
 (b) Write any pattern matching algorithm and explain it with suitable example. 10
  
5. (a) Using Prim's and Kruskal's algorithm, find minimum spanning tree for the following graph :- 10



- (b) What is Hashing ? What is meant by Collision ? Hash the following in table of size 10. Use any two collision resolution techniques :-  
 99 33 23 44 56 43 19. 10

6. (a) Given a 'INFIX' expression, write a program to convert it to its 'POSTFIX' form. 10  
(b) Write an algorithm to traverse a graph using :- 10  
    (i) Breath First Search  
    (ii) Depth First Search.
7. Write short notes on any **four** of the following :- 20  
    (a) Red Black Trees  
    (b) Searching Algorithms  
    (c) Recursion  
    (d) Doubly Linked List  
    (e) Expression Trees  
    (f) Comparision of Sorting Algorithms.

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Con.6574-11.

MP-4174

(3 Hours)

[ Total Marks : 100

- N.B.:** (1) Question No. 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) Perform  $492_{(10)} - 275_{(10)}$  in BCD using 10's complement. 5
- (b) Simplify : — (i)  $(B+BC)(B+\bar{B}C)(B+D)$  2  
 (ii)  $\Sigma m(0, 1, 2, 3, 5, 7, 8, 9, 10, 12, 13)$  using K-map. 2
- (c) Implement following using decoder — 3  
 $f_1(A, B, C) = \Sigma m(0, 4, 7) + d(2, 3)$   
 $f_2(A, B, C) = \Sigma m(1, 5, 6)$   
 $f_3(A, B, C) = \Sigma m(0, 2, 4, 6)$
- (d) (i) Write the truth table and excitation table of JK flip flop. 4  
 (ii) Briefly explain CAD tools for Digital Design. 4
2. (a) Minimize  $\Sigma m(0, 1, 2, 8, 9, 15, 17, 21, 24, 25, 27, 31)$  using Quine-McCluskey 10  
 method. Also find most essential prime implicants.
- (b) Prove that NAND and NOR are universal gates. 10
3. (a) Design a BCD adder. 10  
 (b) Implement Full adder using 8 : 1 MUX. 10
4. (a) Design Mod-12 synchronous counter using JK flip flop. 10  
 (b) Convert :— (i) SR to D F/F 10  
 (ii) JK to T F/F.
5. (a) Given the logic expression  $AB + A\bar{C} + C + AD + A\bar{B}C + ABC$  12  
 (i) Express in standard SOP form.  
 (ii) Minimize using K-map and realise using only NAND gates.
- (b) Implement following using only one 8 : 1 MUX and few gates 8  
 $F = \Sigma m(0, 1, 3, 4, 5, 7, 9, 10, 12, 13, 15)$ .
6. (a) Design 4-bit asynchronous up/down counter. 10  
 (b) Explain 4-bit bidirectional shift register. What are the uses of register ? 10
7. Write short notes on any **two** :— 20  
 (a) ALU  
 (b) Priority Encoder  
 (c) PAL and PLA  
 (d) VHDL features.