

Roll No. ....

Total Pages : 3

BT-3/D-12

8307

**ELECTROMECHANICAL ENERGY  
CONVERSION**

**Paper—ELE-201E**

**Group—I**

**Option—I**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Write an expression of force on current carrying conductor in a magnetic field. 15
- (b) Define static and dynamic emfs. 5
2. (a) Discuss what are the approximations involved in obtaining the equivalent circuit parameters from open circuit and short circuit tests ? Discuss the validity of these tests. Also discuss the effects of frequency and voltage on the equivalent circuit parameters of a transformer. 5,4,5
- (b) Discuss Scott connection of transformer briefly. 6

**UNIT-II**

3. (a) Derive an expression for reluctance torque in a rotating electrical machine. 10
- (b) What are the advantages of analyzing energy conversion devices by field energy concept. 10
4. (a) Explain, how commutator keeps the armature mmf stationary in space along the interpolar axis. 10

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- (b) Draw the speed torque characteristics of DC shunt series and compound motors in one figure and compare them. 10

### UNIT-III

5. (a) What are the advantages of inserting external resistance in the rotor circuit of a wound rotor induction motor at the time of starting. 5
- (b) How is the induction motor operation affected if the external resistance in the rotor circuit is not fully cut off? 5
- (c) Explain, why the starting torque of a capacitance start induction run motor is better than that of a resistance start induction run motor. 5
- (d) Explain, why single phase induction motor can't be self-started. 5
6. (a) Show that a rotating magnetic field can be produced by the use of 3-phase currents of equal magnitude. 6
- (b) What is meant by slip in an induction motor? Develop an expression for frequency of rotor current in it. 7
- (c) Why at all starters are necessary for starting the induction motor? Name various starters used for squirrel-cage motors. 7

### UNIT-IV

7. (a) Explain the two reaction theory as applied to salient pole synchronous machines and draw its phasor diagram for a lagging power factor. 10
- (b) What do you understand by the terms, normal excitation, underexcitation and overexcitation in connection with synchronous motor operation? 10

8. Give reasons for the following :

- (a) Generally cylindrical rotor construction is used for high speed machines and salient pole construction for low speed machines.
- (b) The speed of synchronous generator is kept constant at synchronous speed.
- (c) Both axial and radial ventilating ducts are necessary in cylindrical rotor machines whereas radial ducts are usually sufficient in salient pole machines. 6,7,7

(b) Use dual simplex method to solve

$$\text{Maximize } Z = -3x_1 - x_2$$

subject to

$$x_1 + x_2 \geq 1, \quad 2x_1 + 3x_2 \geq 2, \quad x_1, x_2 \geq 0.$$

8. What are the feasible solution and optimal solution of a L.P.P. ?  
Using simplex method, find the optimal feasible solution of the following L.P.P. :

$$\text{Minimize } Z = x_1 - 3x_2 + 2x_3$$

$$\text{Subject to } 3x_1 - x_2 + 2x_3 \leq 7, \quad -2x_1 + 4x_2 \leq 12, \\ -4x_1 + 3x_2 + 8x_3 \leq 10, \quad x_1, x_2, x_3 \geq 0.$$

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8330

**MATHEMATICS-III**  
**Paper-MATH-201E**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Obtain Fourier series expansion of

$$f(x) = \left( \frac{\pi - x}{2} \right)^2 \text{ for the range } (0 \text{ to } 2\pi).$$

(b) Find Fourier series to represent  $f(x)$  given by

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi}, & 0 \leq x \leq \pi \end{cases}$$

Deduce that

$$\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}.$$

2. (a) Find Fourier transform of

$$f(x) = \begin{cases} x^2 & |x| < a \\ 0 & \text{otherwise.} \end{cases}$$

- (b) Use Fourier sine transform to solve the equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}; \quad (x > 0, t > 0)$$

subject to the conditions :

- (i)  $u(0, t) = 0$ .  
 (ii)  $u(x, t)$  is bounded.  
 (iii)  $u(x, 0) = \begin{cases} 1 & 0 < x < 1 \\ 0 & x \geq 1 \end{cases}$ .

#### UNIT-II

3. (a) If  $f(x)$  is an analytic function with constant modulus, show that  $f(z)$  is constant.  
 (b) Find the regular function, whose imaginary part is  $v = e^{-x}(x \sin y - y \cos y)$ .
4. (a) Find the bilinear transformation which maps the points  $z = -1, i, 1$  of the  $z$ -plane onto  $w = 1, i, -1$  of the  $w$ -plane respectively.  
 (b) Under the transformation  $w = \frac{1}{z}$ , find the image of  $|z - 2i| = 2$

#### UNIT-III

5. (a) Let A and B be two events with their probabilities  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cap B) = \frac{1}{4}$ . Find  $P(A/B)$ ,  $P(A \cup B)$  and  $P(A'/B')$ .

- (b) In a certain college, 4% of the boys and 1% of girls are taller than 1.8 m. Further more 60% of the students are girls. If a student is selected at random and is found to be taller than 1.8 m, what is the probability that the student is a girl?

6. (a) If 10 percent of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen at random (i) none will be defective, (ii) one will be defective and (iii) atleast two will be defective.

- (b) For a normally distributed variate with mean 1 and S.D. 3, find the probabilities that :

- (i)  $3.43 \leq x \leq 6.19$ , (ii)  $-1.42 \leq x \leq 6.18$ .

#### UNIT-IV

7. (a) Using graphical method, solve

$$\text{Min } Z = 20x + 30y$$

subject to  $x + 2y \leq 40$ ,  $2x + y \leq 50$ ,

$$4x + 3y \geq 60, \quad x, y \geq 0.$$

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**BT-3/D-12**

**8331**

**BASICS OF ECONOMICS AND  
MANAGEMENT  
Paper-HUM-201E**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. Define Production Function. Discuss types of Production Function with special reference to Cobb Douglas production function.
2. What do you mean by Monopoly ? Discuss the determination of Price and Output under Monopoly.

**UNIT-II**

3. Define Management. Discuss the various functions of Management.
4. Elaborate on Heary Fayol's principles of Management.

**UNIT-III**

5. Define Planning. Identify the different premises in Planning and discuss the steps involved in Planning.

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6. Differentiate between the following :
- (i) Planning Policy and strategy.
  - (ii) Authority and Responsibility.

#### **UNIT-IV**

7. What do you mean by Manpower Planning ? Discuss the process of Manpower Planning.
8. Define Leadership. Elaborate on the various styles of Leadership.

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**BT-3/D-12**

**8301**

**DATABASE MANAGEMENT SYSTEM**

**Paper—CSE-201E**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. Describe various views of data with the help of illustrative example. What do you understand by data modelling ? Describe various models of data with example. 20
2. Describe the following by giving examples :
  - (a) Entity-relationship diagram
  - (b) Various database constraints and keys. 10.10

**UNIT-II**

3. What do you understand by file organisation ? What are different methods of organising files ? Explain with their cons and pros. 20
4. Describe following concepts/terms and their use :
  - (a) Hashing functions
  - (b) B-trees
  - (c) Inverted lists. 20

**UNIT-III**

5. Describe various types of anomalies in the relation as observed during various operations. How various forms of normalized relations are able to avoid these anomalies ? 20

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6. Describe following by giving examples :
- (a) Various types of dependencies in the relational databases.
  - (b) Various types of constraints experienced in database.
- 10,10

#### UNIT-IV

7. Describe the concept of distributed, parallel and object-oriented databases ? Discuss various problems encountered in management of distributed databases along with their solutions. 20
8. Explain following topics in database context :
- (a) Principle and techniques involved in data mining.
  - (b) Concept of data warehouse and steps involved in its constructions. 10,10

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8305

**SEMICONDUCTOR DEVICES & CIRCUITS**

**Paper—ECE-201E**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Draw the characteristics of a P-N junction diode. Explain the rectifier action. 10
- (b) Draw a bridge full wave rectifier. How does it work ? Draw the waveforms. 10
2. (a) Compare series and shunt voltage regulators. 10
- (b) Write short note on photoelectric devices. 10

**UNIT-II**

3. (a) Draw the doping profile of a BJT. How transistor action is achieved ? 10
- (b) Draw a RC coupled amplifier. How does it work ? 10
4. Explain the following in detail :
  - (a) Transistor Biasing. 10
  - (b) High frequency limitation of BJT's. 10

**UNIT-III**

5. Explain and compare various feedback topologies used in amplifiers. 20

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P. T. O.

6. (a) What is Bark Hausen criterion ? How is it used in oscillators ? 10  
(b) Draw and explain the working of crystal oscillator. 10

#### UNIT-IV

7. Explain the following terms :  
(a) JFET and characteristics. 10  
(b) Pinch off and drain current. 10
8. Write short notes on the following :  
(a) VMOSFET 10  
(b) MOSFET. 10

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**8302**

**DATA STRUCTURES**

**Paper—CSE-203E**

**Option-II**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks. Always write suitable explanation of logic or comment in the program code, wherever needed. In all questions, wherever algorithm or pseudo-code is to be written, you can write equivalent function in C-language syntax also. It will not lead to any deduction of marks. Rather it will be preferable.

**UNIT-I**

1. (a) Write a modular program in C which finds and stores transpose of an  $m * n$  matrix into same matrix. No other matrix should be used in the program at all. Max 7 marks will be given if transpose is not stored in same matrix.
- (b) What do you understand by ADT ? Explain. 14,6
2. (a) Write algorithm to convert given infix expression to postfix expression.
- (b) Write a program to convert a given Sparse matrix to the equivalent non-sparse matrix. 10,10

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P. T. O.

### UNIT-II

3. (a) Write algorithm to reverse a singly linked list and explain its working.
- (b) What is a priority queue and what are its applications?  
12,8
4. (a) Write a algorithm to delete a node from a given doubly linked list. The position of the node will be supplied as an argument to the module. The position can be 1 (meaning first node) to n. Declare the necessary structures needed for this module.
- (b) Write linked list implementation of queue operations.  
10,10

### UNIT-III

5. (a) Using examples, show the prefix and postfix expressions representation using trees.
- (b) How lists are represented using trees? Explain.
- (c) Write algorithm to find height of a binary tree. Explain its working.  
6,6,8
6. (a) Write short notes on the following :
  - (i) Balanced multi-way search trees
  - (ii) B-trees.
- (b) Write a non-recursive implementation of pre-order traversal of binary tree.  
10,10

### UNIT-IV

7. (a) Describe the working of linear probing and chaining. Where are these useful ?

- (b) Step by step, show, how following numbers get sorted using heap sort :  
20, 18, 35, 16, 10, 18, 2, 14. 10,10
8. (a) Define minimum spanning tree. How can we find a minimum spanning tree from a given graph ? Explain with help of a suitable example.
- (b) Draw a directed graph of at least 5 nodes and having at least 8 edges. Show its representation using adjacency list.
- (c) Write algorithm for bubble sort. 8,5,7

(b) The driving point impedance of a network is given by :

$$Z(s) = \frac{6s^3 + 3s^2 + 6s + 2}{3s^3 + 3s}$$

Realize/synthesize the network. 12

8. Write a detailed technical note on fundamentals, response/ characteristics of the following filters :

- (a) Band-reject filters. 20
- (b) High-pass filters.

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8309

**NETWORK ANALYSIS AND SYNTHESIS**

Paper-EE-203-E

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note :** Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

**UNIT-I**

1. For the Electrical network of Fig. 1, draw its topological graph and write its incidence matrix. Select a tree and write the fundamental loop matrix corresponding to the chosen tree. 20

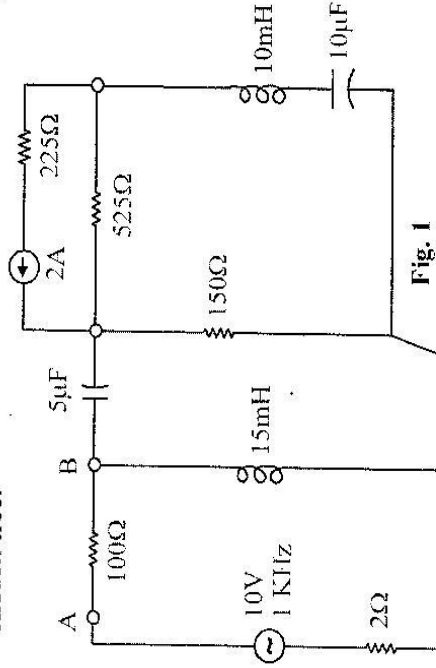
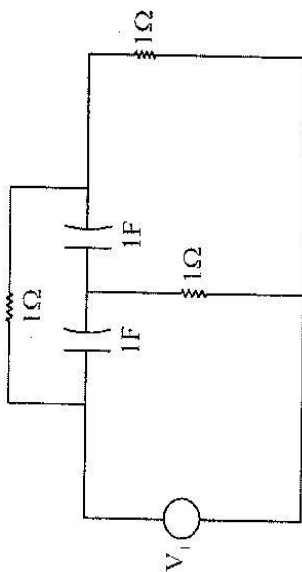


Fig. 1

2. Derive an expression for time-response of an R-L circuit to a unit ramp input. Find the slope of the response curve/ expression at  $t = 0$  & at  $t = \infty$ . Further to which input the expression can be simply deduced from the unit ramp response expression ? 20

**UNIT-II**

3. For the network of Fig. 2, find  $Y_{11}$  and  $Y_{12}$  : 20



**Fig. 2**

4. (a) Test whether following functions represent the RC driving point impedance functions ?

(i)  $Z_1(s) = \frac{(s+1)(s-3)(s+10)}{s(s+2)(s+6)}$ .

(ii)  $Z_2(s) = \frac{(s+1)(s+5)(s+9)}{s(s+2)(s+7)}$ .

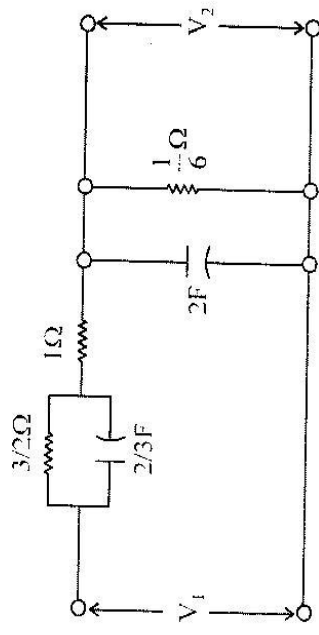
8

- (b) Synthesize the LC network given below into 2nd Foster form : 12

$$Z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}$$

**UNIT-III**

5. Find the transfer admittance ratio  $Y_{12}(s) = \frac{I_2(s)}{V_1(s)}$  for the ckt shown in Fig. 3 : 20



**Fig. 3**

6. Convert h parameters into y parameters and vice-versa. Also convert z into g-parameters and vice-versa. 20

**UNIT-IV**

7. (a) What are the restrictions on poles and zeroes of transfer functions ? 8

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8306

## ANALOG COMMUNICATION

Paper—ECE-203E

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

### UNIT-I

1. (a) Determine expression for noise figure of cascaded amplifier and write final expression for multistage amplifier. 10
- (b) Find overall noise figure of a three stage cascaded amplifier. each stage having a power gain of 20 dB and noise figure of 12 dB. 5
- (c) Give classification of external noise. 5
2. (a) Two resistors  $R_1$  and  $R_2$  at absolute temperature  $T_1$  and  $T_2$  are connected in series to form a white noise source. Find the equivalent noise temperature  $T_{eq}$ . 10
- (b) Explain noise temperature in detail. 10

### UNIT-II

3. (a) Explain, how collector modulation method is used for AM generation. 10
- (b) Explain various methods used for generating SSB-SC signal. 10
4. (a) Explain synchronous detection method for demodulating a DSB-SC signal. 10
- (b) Explain diode detector demodulation technique for AM system. 10

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### UNIT-III

5. (a) Define modulation index for a FM system and show how it effects the spectrum of FM signal. 10  
(b) Explain Varactor diode method for FM generation. 10
6. (a) Explain preemphasis and deemphasis in a FM system using proper diagram. Also derive expression for SNR improvement using preemphasis. 10  
(b) Explain slope detector method for FM demodulation. 10

### UNIT-IV

7. (a) Write note on Armstrong FM transmitter. 10  
(b) Explain in detail sensitivity and selectivity of AM receivers. 10
8. (a) Write note on superheterodyne receiver. 10  
(b) What is image frequency problem related with superheterodyne receiver and how it can be removed ? Elaborate. 10

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**8505**

**BT-5/D12**

**ANTENNA AND WAVE PROPAGATION**

**Paper-ECE-301-E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : (i) Answer any five questions, selecting at least one question from each unit.*

*(ii) All questions carry equal marks.*

**Unit-I**

1. (a) Describe the following terms :
  - (i) Radiation resistance
  - (ii) Beam width
  - (iii) Antenna temperature
  - (iv) Effective aperture
  - (v) Directivity. 10
- (b) Explain the concept of retarded vector and scalar potentials. 10
2. (a) Discuss the significance of radiation and induction fields. 10
- (b) Using suitable schematic, explain the concept of radiation from elementary dipole. 10

**Unit-II**

3. (a) Explain the principle of pattern multiplication using suitable example. 10
- (b) Compare Broadside arrays and End fire arrays. 10

**8505** -9,800

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( 2 )

4. (a) Explain the construction and operation of Turnstile antenna. Also, give its merits and demerits. 10  
(b) Compare Binomial and Chebyshev Array. 10

**Unit-III**

5. Describe the following in detail :  
(i) Pyramidal Horn.  
(ii) Lens Antenna. 10+10=20
6. Discuss the working of the following :  
(i) Log periodic antenna.  
(ii) Conical spiral antenna. 10+10=20

**Unit-IV**

7. Explain the following terms : 20  
(i) MUF  
(ii) Critical frequency  
(iii) Skip distance  
(iv) Virtual height  
(v) Fading.
8. Write short note on the following :  
(i) Different modes of propagation  
(ii) Multipath fading of radio waves. 10+10=20

**8505**

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**8506**

Printed Pages : 2

**BT-5 / D 12**

**COMPUTER HARDWARE DESIGN**

**Paper-ECE-303E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt five questions in all, selecting at least one question from each unit.*

**Unit-I**

1. (a) Discuss the basic addressing modes used in instruction set design. What are the trade-offs involved? 10
- (b) What is the role of macros and subroutines ? Discuss. 10
2. (a) What is Register transfer language ? How do you employ it for microprogramming ? 10
- (b) Discuss the basic types of instructions. 10

**Unit-II**

3. (a) What is ALU ? Discuss the structure used for multiplication of fixed point numbers. 10
- (b) What is parallel processing ? Discuss the various structures used for parallel processing. 10

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( 2 )

4. (a) What are the various methods used for hardware control design ? 10  
(b) Discuss the CPU control unit. 10

### Unit-III

5. (a) What do you understand by serial access memories ? Discuss their organisation. 10  
(b) What are magnetic memories ? Discuss various magnetic memories. 10
6. Write notes on :  
(a) Cache memory 10  
(b) Interleaved memory 10

### Unit-IV

7. What is DMA ? How and why is it employed for data transfer ? Discuss a structure with DMA controller. 20
8. What are interconnection networks ? Discuss various interconnection networks. 20

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**BT-5 / D 12**

**INFORMATION THEORY AND CODING**

**Paper-ECE-305 E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions by selecting at least one from each of the following four units.*

**Unit-I**

1. (a) Discuss clearly with the help of appropriate examples (two), the difference between (i) Random variables and (ii) Random processes. 8
- (b) Let a fair die be rolled with output space  $S = \{f_1, f_2, \dots, f_6\}$ . Let a random variable be defined as  $X(f_i) = 5i$ . Determine and plot (i) cumulative distribution function (ii) Probability density function. 12
2. (a) A coin is tossed until a head appears. Find the expected number of tosses of the coin. 10
- (b) State and prove Chebyshev's Inequality. 10

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(2)

**Unit-II**

- 3. (a) Prove that entropy function is maximum when a source generates equiprobable messages. 10
- (b) State and prove additivity property of an entropy function. 10
- 4. (a) Write and explain five important properties of a prefix code. 10
- (b) A source generates alphabets  $[x_1, x_2, x_3]$  with probabilities  $\left[\frac{1}{2}, \frac{1}{4}, \frac{1}{4}\right]$ . Obtain Huffman tree for its second order extension of the source and determine efficiency of such a code. 10

**Unit-III**

- 5. (a) Explain ! what do you understand by maximum likelihood decoding? 6
- (b) Explain various types of errors in data transmission systems. 6
- (c) How will you generate GF ( $2^n$ ) from GF (2). 8
- 6. (a) Explain the concept of standard array and syndrome decoding techniques of a block code. 10

**8507**

(3)

- (b) Prove that a block code capable of correcting  $\lambda$  errors and simultaneously detecting  $\ell > \lambda$ , errors must have a minimum distance  $d_{\min} = \ell + \lambda + 1$ . 10

**Unit-IV**

- 7. A convolutional code is described by the impulse responses :  
 $\bar{g}_1 = [1, 1, 1], \bar{g}_2 = [0, 1, 1]$   
 $\bar{g}_3 = [1, 0, 1]$ .
  - (a) Write the corresponding transfer functions. 3
  - (b) Draw the encoder. 3
  - (c) Draw the state transition diagram. 4
  - (d) Draw the Trellis diagram. 4
  - (e) Find the overall transfer function and free distance. 6
- 8. Describe the following in detail :
  - (a) Majority logic decodable codes 10
  - (b) Viterbi decoding. 10

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(4)

6. (a) Draw the circuit of current to voltage circuit using OPAMP and explain its operation.  
(b) Find the expression of output  $V_o$  for differential amplifier with 3 OPAMPS or instrumentation amplifier.

**Section-D**

7. (a) What is PLL ? Explain in detail with the help of its block diagram ? List the desirable characteristics of VCO.  
(b) Explain :  
(i) Lock Range  
(ii) Center frequency  
(iii) Capture range  
(iv) Loop gain  
(v) Free running frequency.
8. Write a short note on the following :  
(i) 555 as a Monostable multivibrator.  
(b) Universal active filter.

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**8508**

**BT-5 / D 12**

**LINEAR IC APPLICATIONS**

**Paper-ECE-307-E**

*Time allowed : 3 hours* [Maximum marks : 100]

*Note : (i) Attempt any five questions, with at least one from each section.*

*(ii) All questions carry equal marks.*

**Section-A**

1. Draw the circuit diagram of an emitter coupled differential amplifier and explain its operation. Draw also equivalent half circuit and write down an expression for the difference of mode gain. On what factors do CMRR of this depends ?
2. (a) Give the characteristics of an ideal Operational Amplifier. Hence show that the closed loop gain  $A_{vf}$  of a practical operational amplifier can be given by

$$A_{vf} = \frac{-y}{y' - \left( \frac{1}{A_v} \right) (y' + y + y_i)}$$

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**8508** -9800

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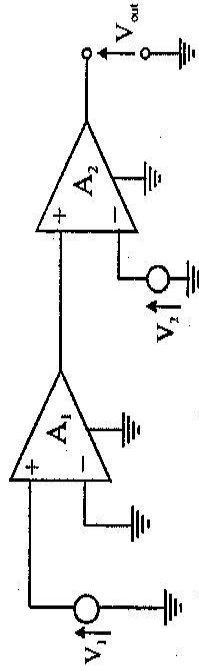
(2)

Where  $A_v$  is the voltage gain without feedback and  $y$ 's are the admittances corresponding to  $Z$ ,  $Z'$  and  $Z_1$  which represent the impedance in the input side, the feedback impedance and the actual impedance respectively.

- (b) Briefly explain the main input and output voltages and currents in an OPAMP. Define slew rate and explain its use in the performance of an OPAMP.

### Section-B

3. (a) Find the value of  $V_{out}$  in the circuit of Figure if  $V_1 = 1\text{ mV}$ ,  $V_2 = 5\text{ V}$ ,  $A_1 = 5000$ , and  $A_2 = 10,000$ . Repeat with  $A_2 = 5001$



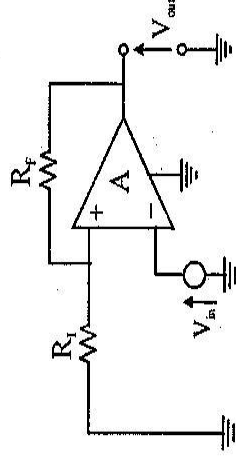
- (b) A negative feedback amplifier has a closed loop gain  $A_f = 1000$  and open loop gain  $A = 10^8$ . What is the feedback factor?

(3)

4. (a) What is the difference between compensated and non compensated OPAMP ?  
(b) What are differential feedback amplifiers ? Derive the output for a differential feedback amplifier with inputs  $V_1$  and  $V_2$ .

### Section-C

5. (a) An amplifier with positive feedback is shown in figure. Derive the relationship of  $V_{out}/V_{in}$ . If the amplification of the operational amplifier  $A = 100$ ,  $R_1 = 100\text{ R}$  and  $R_f = 10,000\text{ R}$  then find out  $V_{out}/V_{in}$ . Comment on the result.



- (b) Sketch the output waveform of an OPAMP differentiator circuit, when input waveform is a square wave. Briefly explain how this waveform is generated at the output.

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**BT-5 / D 12**

**MICROELECTRONICS**

**Paper-ECE-309 E (Opt.II)**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt five questions in all, selecting at least one question from each unit.*

**Unit-I**

1. (a) Draw the schematic diagram of the production of electronic grade silicon from the hydrogen reduction of tri-chlorosilane. 10
- (b) Describe MBE with the help of schematic diagram and explain different constraints in the growth of epitaxial films. 10
2. Describe any *four* of the following : 4×5=20
  - (a) Silicon Oxidation Model.
  - (b) Oxide Charges.
  - (c) Describe the growth kinetics of vapor phase epitaxial growth process.
  - (d) DC sputtering technique, its advantages and disadvantages.
  - (e) Larger Boron concentration at tail end than that at seed end in CZ grown crystals.

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**Unit-II**

- 3. (a) Describe Optical Lithography, also highlight its advantages and limitations. 10
- (b) Explain AC Plasma Excitation and describe Etch rate of Silicon in  $CF_4+O_2$  plasma with percentage  $O_2$  concentration. 10
- 4. (a) Compare e-beam and ion beam lithography. 10
- (b) Describe X-ray lithography, X-ray source and X-ray mask and its limitations. 10

**Unit-III**

- 5. (a) Explain basic diffusion mechanism in solids, Fick's law of diffusion and its solution for the Constant total dopant's. 10
- (b) Compare thermal diffusion and ion implantation techniques. 10
- 6. Describe any two with neat diagram : 20
- (a) Ion-Implanter
- (b) Characteristics of diffused layers
- (c) Range theory in ion-implantation.

**Unit-IV**

- 7. Describe DC and RF sputtering techniques and compare its performances from the point of view of various metallization requirements. 20

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- 8. Write short notes on any four of following : 20
- (a) Double diffusion BJT IC fabrication process sequence.
- (b) Trench Isolation Technique.
- (c) Semi-recessed LOCOS and bird's beak encroachment.
- (d) Dielectric Isolation.
- (e) Constraints in silicon device packaging.

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Roll No. ....

**8510**

Printed Pages : 3

**BT-5 / D 12**

**MICRO PROCESSORS AND INTERFACING**

**Paper-ECE-311 E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Answer any five questions in all, selecting at least one question from each unit. All questions carry equal marks.*

**Unit-I**

1. (a) What are the advantages of 8086 microprocessors over 8085 microprocessor ? Explain the registers structure of 8086. 14
- (b) Write short note on microprocessor bus types and buffering techniques. 6
2. (a) Draw and discuss the pin diagram of 8086 microprocessor. What are the functions of  $\overline{DT/\overline{R}}$  and  $\overline{DEN}$  signals in 8086 microprocessor chip ? 15
- (b) Write note on 8086 minimum mode and maximum mode CPU module. 5

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### Unit-II

3. (a) Use looping to write a sequence to add to 16-digit 10's complement packed BCD numbers. Repeat for unpacked BCD numbers. 8
- (b) Explain following 8086 instructions; CALLDWORD PTR [BX], XLAT, WAIT, CMPS, REP and LDS reg. 12
4. (a) Write 8086 ALP to multiply two matrices each of size 4x4. 7
- (b) Write a procedure which produces a delay of 3.33 ms when run on an 8086 with 5 MHz clock. 6
- (c) Write a note on assembler directives. 7

### Unit-III

5. (a) List the major tasks that must be done to support dynamic RAM in microcomputer system. What timing parameter limits the rate at which data words can be read from rows in a DRAM? Also explain how the page mode operation of a bank of DRAMs makes it possible for microprocessor to read data words without wait states. 12
- (b) Write note on interfacing of SRAMs and PROMs with microprocessor. 8

(3)

6. (a) Describe how a SRAM cache reduces the average number of wait states required by microprocessor which uses DRAM for its main memory. Also explain read/write timing diagram in minimum and maximum mode operation of 8086. 15
- (b) Write short note on TMS4500 DRAM controller. 5

### Unit-IV

7. (a) Describe the conditions which cause the 8086 to perform each of the following types of interrupts; type 0, type 1, type 2, type 3 and type 4. Also describe the purpose of the 8086 interrupt vector table. 11
- (b) Write a program to generate square wave using 8086 microprocessor and other necessary hardware. Clearly explain the use of DAC and PPI in this problem. 9
8. (a) Explain asynchronous mode word for 8251. Write the 8086 instructions to read the status of 8251 and test the errors. 12
- (b) Interface 20 bit ADC with 8086 microprocessor. ADC needs 2ms + ve pulse on SOC pin to start the conversion and provides - ve pulse on EOC pin when conversion is over. 8

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Printed Pages : 2

**8708**

**BT-7/D12**

**VLSIDESIGN**

**Paper-ECE-401-E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions by selecting at least one from each unit.*

**Unit-I**

1. (a) With proper illustrations show how a transistor is fabricated in a LOCOS, self-aligned E/D NMOS process. 12
- (b) Write the equation of threshold voltage of a NMOS transistor and explain each term. 8
2. What is the need of stick diagrams ? Draw a stick diagram of a 1-bit full adder cell in a single poly, single metal N-Well CMOS process. Assume all inputs and outputs to be in poly running vertically from top to bottom on same x coordinate, Power lines to be horizontally running in metal. Give legend. 20

**Unit-II**

3. (a) What are the limits to scaling ? Discuss. 10
- (b) Discuss the complete scaling theory. 10

**8708**

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4. (a) What do you understand by Layout methodologies ?  
Discuss. 10
- (b) Discuss the various packaging techniques used by  
IC industry. Also discuss the merits and demerits  
of each. 10

### Unit-III

5. (a) What is floor planning ? What are the objectives  
of floor planning ? 10
- (b) Discuss one placement algorithm. 10
6. What is Kernighan-Lin algorithm ? How can one use the  
algorithm for a vertex set with an odd number of elements  
 $2n + 1$  elements ? What about a situation in which the  
sets do not need to have the same size but may differ by  
at most  $m$  elements ? 20

### Unit-IV

7. Discuss the Timing driven Placement and Routing.  
Discuss the critical issues involved and algorithms used  
to tackle them. 20
8. Discuss the following : 20
- (a) Delay Models
- (b) Timing driven routing via minimization.

**8708**

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Printed Pages : 2

**8709**

**BT-7/D12**

**TELEVISION ENGINEERING**

**Paper-ECE-403-E Opt. (i)**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions by selecting at least one from each unit.*

**Unit-I**

1. (a) Write short note on flicker. How we can reduce flicker ? 10
- (b) What is the total channel bandwidth required in Indian TV System ? Explain with suitable diagram. 10
2. Give the detail of horizontal and vertical sync pulses. Why we cut slots in vertical sync pulse ? What is the need of using pre and post equalizing pulses ? 20

**Unit-II**

3. (a) For what purpose we are using Picture tube ? With suitable block diagram, explain working of picture tube. 10
- (b) Write short note on Vidicon camera tube. 10

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4. With suitable diagram explain working of monochrome signal receiver. 20

**Unit-III**

5. (a) What do you understand by term compatibility ? Also explain various requirements to meet system fully compatible. 10
- (b) Write short note on luminance, hue and saturation, and interleaving process. 10
6. With suitable diagram explain working of NTSC Transmitter and Receiver. 20

**Unit-IV**

7. Write short note on HDTV and Camcorders. 20
8. Write short note on facsimile and television via satellite. 20

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Printed Pages : 2

**8710**

**BT-7/D12**

**OPTICAL COMMUNICATION**

**Paper-ECE-405-E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions all questions carries equal marks and select at least one question from each unit.*

**Unit-I**

1. Discuss how light is guided into the core of the optical fiber and derive an expression for allowed mode into the fiber. Based on this give condition for propagation of a single mode in optical fiber. 20
2. Discuss various splicing and connecting techniques used for optical fiber network layout. What are the basic differences between single mode fiber connectors and multimode fiber connectors ? 20

**Unit-II**

3. What are the various factors which causes attenuation in fiber ? Discuss various extrinsic losses due to geometrical effects. Give details of microbending loss and compare it with coupling/connectivity losses. 20
4. Discuss dispersion effect in pulse transmitting along an optical fiber. Give details of dispersion caused by Group velocity and derive a relation between pulse broadening  $\Delta T_{\text{mat}}$  and material dispersion  $D_{\text{mat}}$ . 20

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### Unit-III

5. What are the various sources used in optical fiber communication and what should be broad characteristics of these sources ? Discuss and compare single and double hetrostructure LEDs and its advantages in optical communication. 20
6. Give a typical structure for PIN photodiode and its field distribution. What are advantages if PIN diode are fabricated in hetrojunction structure ? Discuss a basic arrangement for study of Impulse and frequency response of PIN diodes and give a typical responsibility curve for such photodiodes. 20

### Unit-IV

7. Give a typical block diagram for a fiber optic communication network with typical information transmission sequences. Discuss wavelength division multiplexer used in such network and give detail of various components used in WDM. 20
8. What are basic amplification technique in an optical amplifier and how it is different from that of semiconductor amplifiers ? Distinguish between semiconductor optical amplifier and a fiber amplifier. 20

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Total Pages : 3

BT-7/D-12

**8712(R)**

**MICROCONTROLLERS**

**Paper-ECE-415E**

Time Allowed : 3 Hours]

[Maximum Marks : 100

Note : Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) What do you understand by embedded systems? Give some real life examples of embedded system. 4
- (b) What are the differences between the microcontroller and microprocessor. 8
- (c) Discuss the applications of microcontrollers in detail. 8
2. Discuss the 4-bit, 8-bit, 16-bit and 32-bit micro-controllers. 20

**UNIT-II**

3. (a) Discuss the 8051 architecture with a neat diagram. 12
- (b) Discuss the memory structure of 8051. 8

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4. (a) Describe the different modes of operation of timers in 8051. 8
- (b) Explain the Timer/Counter functional unit of Microcontroller 8051 with relevant diagrams. 12

#### UNIT-III

5. (a) Write the 8051 instructions for the following operations : (Any six) 2×6=12
  - (i) Place the number 3Bh in internal RAM locations 30h to 32h.
  - (ii) Set the SP at the byte address just above the last working register address.
  - (iii) Copy the contents of DPTR to registers R0(DPPL)
  - (iv) R1(DPH).
  - (v) Exchange both low nibbles of R0 and R1.
  - (vi) Copy the data on the pins of port 2 to the port 2 latch.
  - (vii) Store the contents of RAM location 20h at the address contained in RAM location 08h.
- (b) Explain the various addressing modes of 8051 in detail. 8
6. (a) Code the following problem in three ways :  
Place any number in internal RAM location 3Ch and increment until the number equals 3Ah. 12
- (b) Write 8051 ALP to read data from port 1 when negative edge triggered at INT0 and supply the data to port 2 by masking the upper 4 bits. 8

#### UNIT-IV

7. (a) Discuss the interfacing of ADC and DAC with 8051. 12
- (b) Discuss the serial data communication Mode 1. 8
8. (a) With a neat circuit diagram, explain, how a 4×4 keypad is interfaced with 8051 microcontroller and write 8051 ALP for keypad scanning. 12
- (b) Discuss the serial data communication Mode 2. 8

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Printed Pages : 2

**8712**

**BT-7/D12**

**MICROCONTROLLERS**

**Paper-ECE-415-E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt five questions by selecting at least one from each unit.*

**Unit-I**

1. (a) Discuss any two applications of microcontroller with the help of block diagram.  
(b) Explain the step by step development of microcontroller.  
(c) Explain the four characteristics of microcontroller. 8+6+6
2. Explain the architecture of 8051 in detail. 20

**Unit-II**

3. (a) Explain the internal RAM organization of 8051 microcontroller.  
(b) Explain the serial modes of 8051 microcontroller.  
(c) Explain the function of TMOD special function register. 8+6+6
4. (a) Interface 32KB of RAM and 32KB of ROM to 8051 microcontroller. Draw the interfacing diagram and memory map.  
(b) Explain the Boolean variable (bit handling) instructions of 8051. 10+10

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**Unit-III**

5. (a) Write an assembly language program for 8051 microcontroller to generate a triangular wave on P1.1 pin of 8051.  
(b) Write an assembly language program for 8051 microcontroller to arrange the ten numbers in ascending order. 10+10
6. (a) Draw the interfacing of LCD display to 8051 microcontroller. Write assembly language program to display "HELLOW" on LCD display.  
(b) Write an assembly language program for 8051 microcontroller to add two 32-bit numbers. 10+10

**Unit-IV**

7. (a) Draw the interfacing of 8 LEDs to port 1 of 8051 microcontroller. Write an assembly language program blink LEDs ON and OFF continuously.  
(b) Draw the interfacing of ADC 0808 to 8051 microcontroller and write an assembly language program to read analog sample connected at channel 2 of ADC 0808 and store its digital value in 7000H memory location. 10+10
8. Draw the interfacing of 8X8 matrix keyboard and four seven segment display to 8051 microcontroller. Write an assembly language program to display "NEW" when key '0' is pressed. 20

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Printed Pages : 2

**8714**

**BT-7/D12**

**ADVANCED MICROPROCESSORS**

**Paper-ECE-423-E**

*Time allowed : 3 hours*

*[Maximum marks : 100*

*Note : Attempt any five questions in all, selecting at least one from each unit. All questions carry equal marks.*

**Unit-I**

1. (a) Explain the various addressing modes of 8086 microprocessor. 10
- (b) Describe the conditions which cause the 8086 to perform each of the following types of interrupts; type 0, type 1, type 2, type 3, and type 4. Also describe the purpose of the 8086 interrupt vector table. 10
2. (a) Discuss the real and virtual modes execution of INTEL's X86 (80386) family. 9
- (b) What is the difference between the min and max mode as applied to the 8086 microprocessor? What is the difference between real mode and protected mode of X86 microprocessors? 6
- (c) Explain the following 8086 signals/pins  $\overline{READY}$ ;  $\overline{LOCK}$ ;  $\overline{TEST}$ ;  $\overline{BHE}$ . 5

**Unit-II**

3. (a) Explain the directives : ASSUME, ENDP, EXTRN, OFFSET EQU AND SUM. 12

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- (b) Explain with the help of examples the difference between Branch and Loop instructions of 8086 microprocessor. 8
4. Describe the internal diagram of Intel 80286 microprocessor. Also discuss the different mode of operation of 80286 microprocessor. 20

### Unit-III

5. (a) Describe the pin diagram of 80287 arithmetic co-processor. 10
- (b) Explain data transfer; arithmetic, constant operation, and control instruction set of 80287 processor. 10
6. (a) Explain how to interface the 80287 arithmetic co-processor with 80286 Microprocessor. 8
- (b) Discuss the 80287 arithmetic co-processor status and tag register format. 12

### Unit-IV

7. Write note on 80387 co-processor, its interfacing with 386 microprocessor and its applications. 20
8. List three major advances that the 80487 Co-processor has over the 80387. Describe the 80387 timing requirements of the interface unit. 20

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Printed Pages : 2

**8716**

**BT-7/D12**

**POWER ELECTRONICS**

**Paper-ECE-427-E**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions by selecting at least one from each unit.*

**Unit-I**

1. (a) Describe the construction and characteristics of Schottky diode. 17
- (b) How does power diode differ from ordinary P-N-junction diode ? 3
2. (a) Draw the characteristics of SCR and explain its operation. Mark the -ve resistance region on the characteristics. 14
- (b) What are the limitations of R and R-C firing circuits ? 6

**Unit-II**

3. Explain the operation of a six-pulse converter. How does it compare with 12-pulse converter ? 20
4. (a) Discuss the reactive power demand for a converter. Also comment upon the input power factor of a converter. 16

**8716**

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- (b) What do you mean by dual converter, how is it distinct from an ordinary converter? 4

### Unit-III

5. (a) Why is a current source inverter so called? Describe the operation of CSI. 15
- (b) How do MOSFET based inverters compare with transistor based inverters? 5
6. Explain the circuit and operation of a modified McMurray Half-bridge inverter. 20

### Unit-IV

7. Discuss four quadrant chopper. How is it different from one and two quadrant choppers? 20
8. (a) Write a short note on non-circulating type cycloconverter. 16
- (b) Describe the basic principle of step up chopper. 4