

Seat Number

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## Biomedical Engineering (145103)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicates full marks.
5. Solve **any two** questions from each unit.

### UNIT – I

- |    |  |   |
|----|--|---|
| 1. | Explain with neat sketch Man- Instrumentation system.                  | 8 |
| 2. | What is Biopotential? How Biopotential is generated in a cell explain. | 8 |
| 3. | Write short notes on<br>i) PMMC Recorder<br><br>ii) XY Recorder        | 8 |

### UNIT – II

- |    |   |   |
|----|---|---|
| 1. | Explain the pulmonary circulatory system.                           | 8 |
| 2. | Write short notes on DC Defibrillator.                              | 8 |
| 3. | Explain Blood pressure measurement technique with sphygmomanometer. | 8 |

**UNIT – III**

1. What is EEG? Explain in detail. 8
2. What is Nervous system? Explain peripheral nervous system. 8
3. What is EMG? Why it is required? 8

**UNIT – IV**

1. Explain in brief respiratory system. 8
2. What is Spirometer? Explain with diagram inverted bell spirometer. 8
3. Explain in detail Ultrasonic Blood flow meter. 8

**UNIT – V**

1. How x-rays are produced? Give applications of x-ray in medical field. 8
2. Explain CT scan. 8
3. Give the safety aspects in electro surgical units. 8

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## Network System & Filter Design (145102)

P. Pages : 3

Time : Three Hours

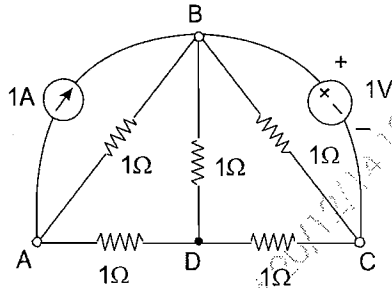
Max. Marks : 80

Instructions to Candidates :

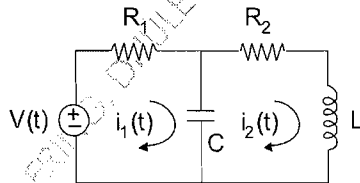
1. Do not write anything on question paper except Seat No.
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3. Students should note, no supplement will be provided.
4. Assume suitable data if necessary.
5. Use of non programmable calculator is allowed.
6. Attempt **any two** sub questions from each unit.

### UNIT – I

1. a) For the network given below draw the directed graph. Also draw possible number of trees. Write tieset matrix 8



- b) Obtain the state model of the electrical network shown in fig. 8



- c) State and Explain the Advantages of state variable analysis. 8  
And define state variables.

### UNIT – II

2. a) A discrete time signal  $x(n]$  is defined as- 8

$$x(n) = 1 + \frac{n}{3}, -3 \leq n \leq -1$$

$$= 1, 0 \leq n \leq 3$$

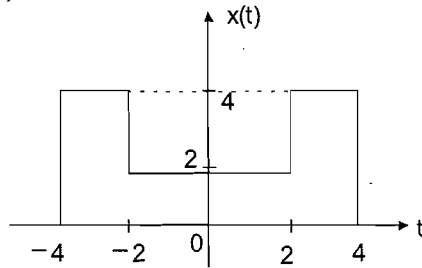
$$= 0, \text{ otherwise}$$

- 1) Determine & sketch the signal  $x(n]$
- 2) Sketch the signal as-
  - i) First fold  $x(n]$  & then delay by 4 samples
  - ii) Delay the signal by 4 samples & then fold.

- b) Write on following signals with illustrations- 8
- i) Energy and power signals.
  - ii) Periodic and non periodic signals.

- c) Find the energy of the signals given below. 8

i)



ii) 
$$x(n) = \begin{cases} n^2 & , 0 \leq n \leq 3 \\ 10 - n & , 4 \leq n \leq 6 \\ n & , 7 \leq n \leq 9 \\ 0 & \text{otherwise} \end{cases}$$

### UNIT – III

3. a) Find the convolution integral for the signals 8  
 $x_1(t) = e^{-4t} u(t)$ ,  $x_2(t) = u(t-4)$

- b) Find the zero input and zero state response and total response 8  
of the system.

$$2y''(t) + 3y'(t) + y(t) = u(t) \text{ with initial conditions}$$

$$y(0) = -1 \text{ \& } y'(0) = 1.$$

- c) Compute linear convolution of the following. 8

$$x(n) = \left\{ \underset{\uparrow}{1} \quad 1 \quad 1 \quad 1 \right\}$$

$$\text{and } h(n) = \left\{ \underset{\uparrow}{1} \quad 1 \quad 1 \quad 1 \right\}$$

#### UNIT – IV

4. a) What is the need of approximation technique in filter design? And also explain the basic properties of Butterworth filter. 8
- b) Determine the order of a low pass Butterworth filter that is to provide 40 dB attenuation at a frequency which is twice the cut off frequency. 8
- c) Outline the procedure to find transfer function of chebyshev approximation. 8

#### UNIT – V

5. a) List the advantages of Active filters over passive filters. 8
- b) Design second order Butterworth low pass filter having upper cut off frequency of 1KHZ. Also give the design steps. 8
- c) Design narrow band pass filter with two feedback paths with  $f_0 = 1.5 \text{ KHZ}$ ,  $Q = 7$  and  $K = 15$ . 8

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चमक - 043

## Industrial Organization & Management (145105)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Figure to write indicates full marks.

### UNIT - I

1. a) What do you mean by "Globalisation" 8  
b) Explain "Textile Engineering Process" in Briefly. 8  
c) Explain different types of Business in detail. 8

### UNIT - II

2. a) Explain different types of planning. 8  
b) Explain levels of management. 8  
c) Explain organizing, co-ordinating, directing & controlling in case of management. 8

### UNIT - III

3. a) Which are the different Types of organisation? Explain in detail. 8  
b) Which are the different steps in forming the organisation. 8  
c) What do you mean by "co-operative sector" Explain Briefly. 8

**UNIT - IV**

- |  |   |
|--|---|
| 4. a) What is Needs of Training & development? | 8 |
| b) Explain Maslow's Theory of motivation.      | 8 |
| c) Explain Recruitment Procedure in detail.    | 8 |

**UNIT - V**

- |   |   |
|---|---|
| 5. a) What are the Importance of Ethics?      | 8 |
| b) Which are the Responsibility of managers.  | 8 |
| c) Write a Note on "Workman compensation Act" | 8 |

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Seat Number

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चमक - 044

## Microcontroller Systems (145101)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Solve **any two** questions from each unit.
6. Assume suitable data if required.

### UNIT – I

1. a) Draw and explain architecture of 8051 microcontroller. 8  
b) Explain internal RAM organisation of 8051 microcontroller. 8  
c) i) Explain stack operating in 8051 microcontroller with example. 4  
ii) Explain dual role of port 3 of 8051 microcontroller. 4

### UNIT – II

2. a) Explain addressing modes of 8051 microcontroller with two examples of each mode. 8  
b) Explain any four following instructions with example. 8  
i) ADD A, @R0 ii) DEC @R0  
iii) MOVC A, @ A+ DPTR iv) MOV X A, @ R1  
v) DJNZ vi) MUL AB.  
c) Write an assembly language program for 8051  $\mu$ c to copy block of 10 Bytes of data from RAM locations starting at 35H to RAM locations starting at 60H. 8

## UNIT – III

3. a) Write an assembly language program for 8051  $\mu$ c, to generate square wave of 2KHz on pin P2.3 using Timer 0. Assume XTAL = 12 MHz. 8
- b) Write an assembly language program for 8051  $\mu$ c to transfer message "SAVE THE EARTH" serially with board rate of 9600 bps. Assume XTAL = 11.0592 MHz. 8
- c) i) Draw and explain format of TMOD register of 8051  $\mu$ c. 4
- ii) Explain different operating modes of Timer / Counter in 8051  $\mu$ c. 4

## UNIT – IV

4. a) Draw interfacing diagram of 8kx8 RAM memory with 8051  $\mu$ c. Starting address of interfaced RAM should be 2000 H. 8
- b) Draw interfacing diagram of 16 x 2 LCD module with 8051  $\mu$ c. Write an assembly language program to display "NMU" on first line of LCD. 8
- c) Interface ADC 0808 IC with 8051 micro controller. Write an assembly language program to convert analog voltage present on input channel 0, to its digital form. Display digital reading on port 3. 8

## UNIT – V

5. a) Explain I<sup>2</sup>C protocol in details. Explain start and stop condition / events in I<sup>2</sup>C. 8
- b) Write a short note on MODBUS also explain Query – Response cycle in MODBUS. 8
- c) Draw and explain block diagram of PIC 16C61. 8

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चमक - 045

## Control System Techniques (145104)

P. Pages : 3

Time : Three Hours

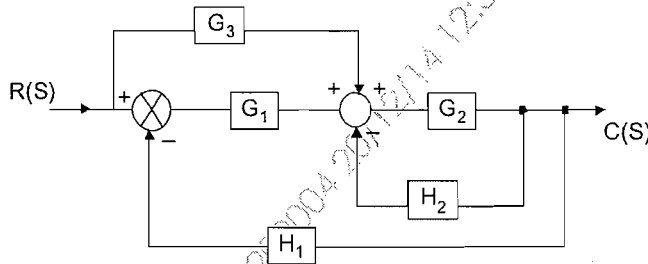
Max. Marks : 80

Instructions to Candidates :

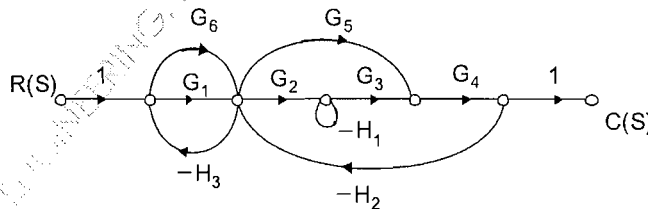
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicates full marks.
5. Solve **any two** from each question.
6. Use of non programmable calculator is allowed.

### UNIT - I

1. a) What is control system ? Explain with example open & closed loop control system. 8
- b) With the help of block diagram reduction technique find the overall transfer function of the sys. shown. 8



- c) State Mason's gain formula. Derive T.F. for given SFG. 8



चमक - 045

## UNIT – II

2. a) Define with the help of time response curve diff. time response specifications. 8
- b) Calculate static error coeff. ( $k_p$ ,  $k_v$ ,  $k_a$ ) for 8  

$$G(S) = \frac{50(S+5)}{S^2}$$
- c) Draw the root locus for the system. 8  

$$G(S)H(S) = \frac{K}{S(S+3)(S+6)}$$
  
 And comment on stability.

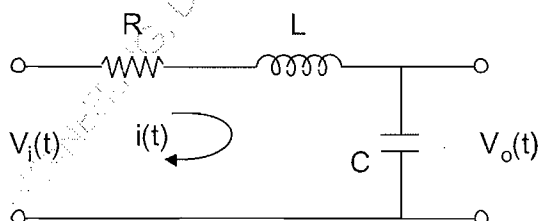
## UNIT – III

3. a) Define : 8
- Gain margin.
  - Phase margin.
  - Gain cross over frequency.
  - Phase cross over frequency.
- b) Sketch asymptotic bode plot for 8  

$$G(j\omega)H(j\omega) = \frac{10\left(1+j\frac{\omega}{4}\right)}{j\omega(1+j\omega)\left(1+j\frac{\omega}{10}\right)}$$
- c) What is mapping ? Explain the principle of argument. 8

## UNIT – IV

4. a) Obtain state model of the given electrical network. 8  
 Given at  $t = t_0$ ,  $i(t) = i(t_0)$  &  $V_0(t) = u_0(t_0)$



- b) When a system is said to be controllable. Explain. 8
- c) Define the following : 8
- i) State space.
  - ii) State variable.

**UNIT – V**

5. a) Draw & explain architecture of PLC. Give the applications of PLC. 8
- b) Develop a ladder logic for counting persons entering in a room. 8
- c) What is scan cycle ? Explain scan time & watch dog timer. 8

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## Mechatronics (1070)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Neat diagram must be draw wherever necessary.
6. Assume suitable data, if necessary.
7. Figures to the right indicates full marks.

### UNIT – I

1. a) What is proximity sensors? What are their different types? Explain ultrasonic proximity sensor? 10
- b) Explain the Bimetallic strip temperature sensor & RTD? 10
- c) Write notes: 10
  - i) load cell.
  - ii) Tachogenerator.

### UNIT – II

2. a) Explain Signal conditioning circuits for temperature sensor? 10
- b) Distinguish between inverting and Non-inverting Amplifier? 10
- c) Write short notes:- 10
  - i) Signal conditioning concept.
  - ii) Logarithmic Amplifier.

## UNIT – III

3. a) With neat Circuit diagram explain hydraulic actuation system component. 10
- b) Discuss about following types of DC motors. 10
- i) Separately excited DC motors.
- ii) Self excited DC motors.
- c) Write short notes 10
- i) Belt chain.
- ii) Gear and Gear Ratio.

## UNIT – IV

4. a) Explain the operation of PLC? 10
- b) Draw & Explain two types of PLC input & output circuits. 10
- c) Write notes. 10
- i) PLC power connection.
- ii) Selection of PLC.

## UNIT – V

5. a) Explain Interfacing of 8051 with stepper motor? 10
- b) Explain the open collector, totem pole and tristate of Digital IC output configuration. 10
- c) Write short notes. 10
- i) Interfacing of microcontroller with 7 segment display.
- ii) Interfacing concept.

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## Electronics Measurements (1080)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory. Attempt **any two** from each question.
5. Figure to the right indicates full marks.
6. Assume suitable data if necessary.
7. Neat diagram must be drawn whenever necessary.

### UNIT – I

1. a) Draw and explain basic principle of LCR-Q meter with different connections. 10
- b) Draw and explain true RMS meter with advantages and disadvantages. 10
- c) Draw and explain AC voltmeters using rectifiers. 10

### UNIT – II

2. a) i) Draw and explain digital pH meter. 5
- ii) Draw and explain digital phase meter. 5
- b) Draw and explain digital tachometer. 10
- c) Draw and explain frequency ratio measurement. 10

**UNIT – III**

- |   |    |
|---|----|
| 3. a) Draw and explain sine wave generator.       | 10 |
| b) Draw and explain digital fourier analyzer.     | 10 |
| c) Draw and explain OTDR meter with applications. | 10 |

**UNIT – IV**

- |  |    |
|--|----|
| 4. a) Draw and explain digital storage oscilloscope. | 10 |
| b) Draw and explain digital readout scopes.          | 10 |
| c) Compare dual beam CRO with dual trace CRO.        | 10 |

**UNIT – V**

- |  |    |
|--|----|
| 5. a) Draw and explain computer based testing of audio amplifier and radio receiver. | 10 |
| b) Draw and explain generalised data acquisition system.                             | 10 |
| c) Draw and explain data loggers.  | 10 |

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Seat Number

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## Electronics Communication (1110)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** sub questions from each unit.
5. Assume suitable data if necessary.
6. Figures to the right indicate full marks.
7. Use of non programmable calculator is allowed.

### UNIT – I

1. a) Explain the term modulation? Discuss the need of modulation by giving suitable examples? Explain the relationship between energy contain in photon and frequency. 10
- b) Define and explain following terms in Television : 10
  - i) Synchronization.
  - ii) Interlaced Scanning
  - iii) Aspect Ratio.
- c) Draw and Explain OSI reference model in detail. 10

### UNIT – II

2. a) Discuss the difference between Narrow band FM and Broad band FM. Why the range of communication at VHF/UHF are restricted? Discuss the solution to extend the range of communication. 10

- b) Draw the block diagram of FM microwave radio transmitter? Explain each block in detail. What is maximum permissible frequency deviation? Discuss the relationship between frequency deviation and modulation index. 10
- c) A low power, short – range radar is solid state throughout, including a low noise RF amplifier which gives it an overall noise figure of 4.77 dB. If the antenna diameter is 1m, the IF bandwidth is 500KHz, the operating frequency is 8 GHz and the radar set is supposed to be capable of detecting targets of 5.m<sup>2</sup> cross sectional area at a maximum distance of 12km, what must be the peak transmitted pulse power? 10

### UNIT – III

3. a) What do you mean by standard telephone bandwidth maintaining articulation? Draw block diagram of standard telephone set and explain it working? 10
- b) Draw and explain circuit for half duplex telephone circuit. How it is converted into full duplex communication. 10
- c) Write short note on :
- i) Caller ID system. 5
- ii) Cordless telephones. 5

### UNIT – IV

4. a) Explain principles of crossbar switching? Discuss with block cross bar exchange organisation? 10
- b) Explain the following terms : 10
- i) Frequency reuse
- ii) Cell – splitting
- iii) IS – 95 standard.
- c) Explain basic principle of cellular telephone? With the help of neat block schematic explain GSM architecture. 10

## UNIT – V

5. a) Sketch diagram of composite video signal, Explain the following terms. 10
- i) Horizontal blanking pulse.
  - ii) Vertical blanking pulse.
  - iii) Front Porch.
  - iv) Back Porch.
  - v) Pedestal Height.
  - vi) White level
  - vii) Synchronizing pulses.
- b) List the colour camera tube. Explain Image orthicon camera tube by giving diagram. 10
- c) Writes short note on : 10
- i) Cable T.V.
  - ii) 3 – D T.V.

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Seat Number

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चमक - 054

## **Analog Integrated Circuits & Applications (1100)**

**P. Pages : 2**

**Time : Three Hours**

**Max. Marks : 100**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** subquestions from each unit.
5. Assume suitable data if necessary.
6. Use of non-programmable calculator is allowed.
7. Figure to right indicates full marks.

### **UNIT – I**

1. a) What is the use of level shifter stage ? Draw circuit diagram of level shifter and explain in detail. **10**  
b) Why is the current mirror circuit used in differential amplifier stages ? Explain it's operation. **10**  
c) Explain virtual ground concept. Define following op-amp parameters. **10**  
i) PSRR, ii) SVRR,  
iii) CMRR, iv) Slew Rate,  
v) Input offset Current, vi) Gain-bandwidth product.

### **UNIT – II**

2. a) Define Instrumentation amplifier and list it's requirements. Draw instrumentation amplifier using one op-amp and list it's limitation. Explain in brief, how these limitations are eliminated in instrumentation amplifier using three op-amps. Derive expression for output voltage of such instrumentation amplifier. **10**

- b) Explain the operation of Half wave and full wave precision rectifier. 10
- c) Design a differentiator using opamp to differentiate an input signal with  $f_{\max} = 200\text{Hz}$ . Also draw the output waveforms for a sine wave and square wave input of 1 volt peak at 200Hz. 10

### UNIT – III

3. a) Draw block diagram of IC8038. List it's features and explain working in detail. 10
- b) Draw & explain the working of a schmitt trigger with waveforms & advantages. 10
- c) Design a square wave generator using one opamp which can generate 1.5kHz frequency signal with 60% duty cycle. 10

### UNIT – IV

4. a) List specifications of LM380. Explain any one application of it. 10
- b) Discuss with block schematic the operation of PLL. Explain the terms capture range, lock range and pull in time of PLL. 10
- c) Write short notes on : 10
- V to F convertor using one opamp.
  - Transfer characteristic of PLL.

### UNIT – V

5. a) Given a band pass filter with resonant frequency  $f_r$  of 1000Hz and a bandwidth (B) of 3000Hz, find it's 10
- Quality factor,
  - Lower cut-off frequency &
  - Higher cut-off frequency.
- b) List features of ADC. Explain successive approximation type ADC in detail. 10
- c) Write short note on : 10
- R-2R ladder DAC.
  - Sample and Hold circuit.

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चमक - 055

## Electronics Circuit Design (1090)

P. Pages : 5

Time : Three Hours

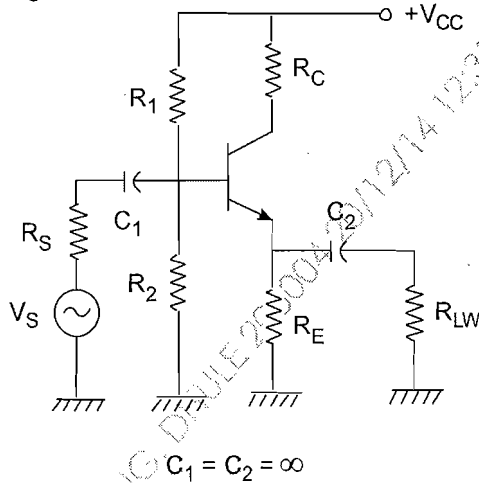
Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
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3. Students should note, no supplement will be provided.
4. Solve **any one** question from each unit.
5. Assume suitable data, if necessary.
6. Use of non programmable calculator is allowed.
7. Figures to right indicate full marks.

### UNIT - I

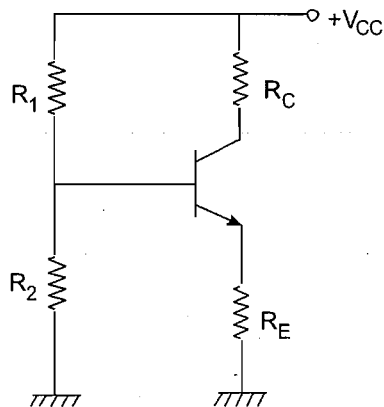
1. a) Find Q point, draw DC equivalent circuits for the amplifier shown in fig. 10



Given  
 $V_{CC} = 15\text{ V}$   
 $\beta = 30$   
 $R_C = 3.3\text{ k}\Omega$   
 $R_E = 2\text{ k}\Omega$   
 $R_{LW} = 100\text{ k}\Omega$   
 $R_1 = 100\text{ k}\Omega$   
 $R_2 = 10\text{ k}\Omega$   
 $R_S = 1\text{ k}\Omega$

$C_1 = C_2 = \infty$

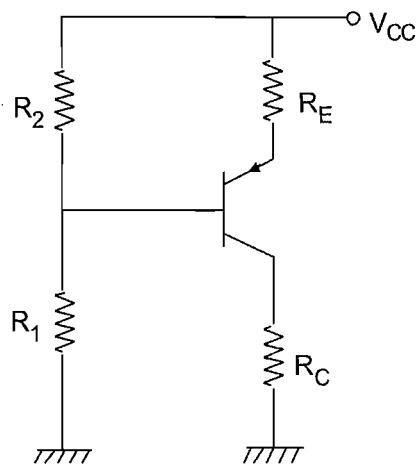
- b) Find the operating point for the following voltage divider network. 10



Given  
 $V_{CC} = +12V$   
 $\beta = 100$   
 $R_C = 4.7k\Omega$   
 $R_E = 1.3k\Omega$   
 $R_1 = 30k\Omega$   
 $R_2 = 10k\Omega$

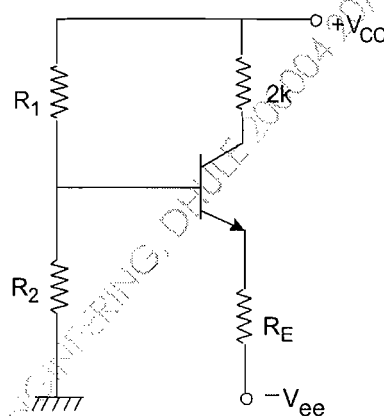
OR

2. a) Find operating point for following biasing network. 10



Given  
 $\beta = 75$   
 $V_{CC} = 12V$   
 $R_E = 3.9k\Omega$   
 $R_C = 8.2k\Omega$   
 $R_1 = 62k\Omega$   
 $R_2 = 20k\Omega$

- b) Find the operating point of following bias circuit. 10



Given  
 $V_{CC} = V_{ee} = \pm 18V$   
 $\beta = 125$   
 $R_C = 2k\Omega$   
 $R_E = 4.7k\Omega$   
 $R_1 = 100k\Omega$   
 $R_2 = 51k\Omega$

## UNIT - II

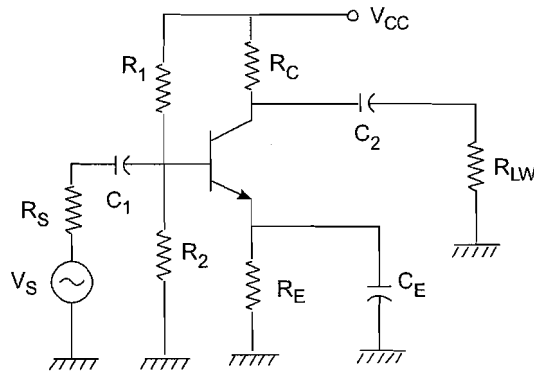
3. a) Derive the expression of common base amplifier for voltage gain 10 with small signal model.

- b) With small signal model write expression for voltage gain of 10 common emitter amplifier.

OR

4. a) Using FET common gate amplifier derive the expression of voltage gain using small signal model. 10

- b) Calculate  $A_V$ ,  $A_I$ ,  $R_I$ ,  $R_O$  for the following circuit ? Use  $\beta = 100$ ,  $V_{CC} = +12V$ . 10



Given

$$C_1, C_2, C_E \rightarrow \infty$$

$$R_C = 4.3 \text{ k}\Omega$$

$$R_E = 1.3 \text{ k}\Omega$$

$$R_1 = 30 \text{ k}\Omega$$

$$R_2 = 10 \text{ k}\Omega$$

$$R_s = 1 \text{ k}\Omega$$

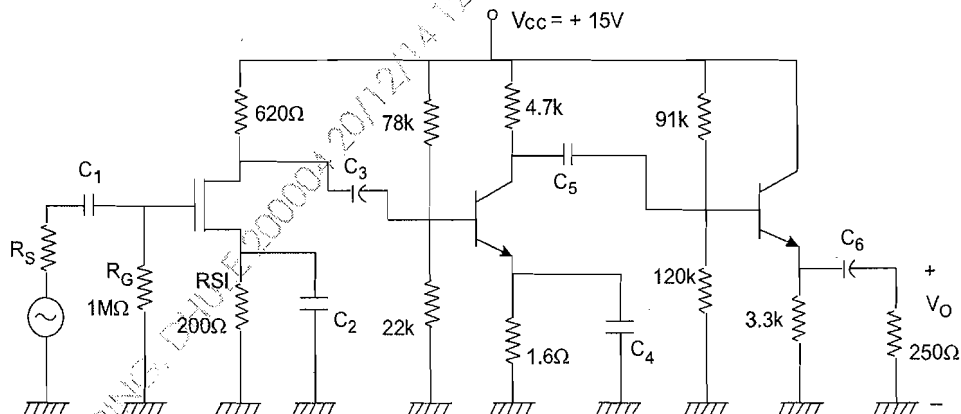
## UNIT - III

5. a) Calculate  $A_V$ ,  $A_I$ ,  $R_I$  &  $R_O$  for the following multistage amplifier. 20

$$M_1 \quad K_n = 100 \text{ mA/V}^2 \quad V_{TN} = -2V, \lambda = 0.02 \text{ V}^{-1}$$

$$T_2 \quad \beta_f = 150, \quad V_A = 80V, \quad V_{BE} = 0.7V$$

$$T_3 \quad \beta_f = 80, \quad V_A = 60V, \quad V_{BE} = 0.7V$$

Given :  $R_s = 10 \text{ k}\Omega$ 

OR

6. a) Write short notes on :

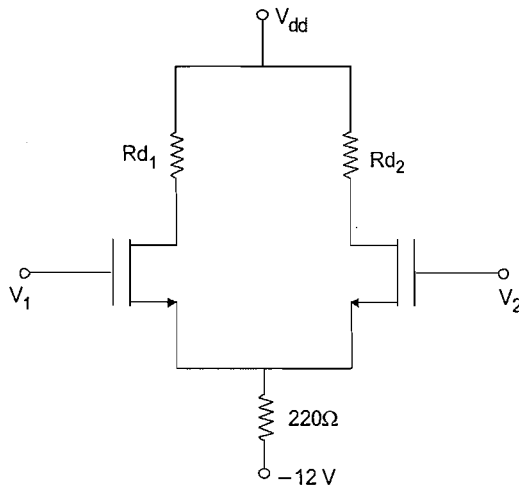
10

i) Differential amplifier.

ii) Electronics current source.

b) Find the operating point and CMRR for the following circuit, use  $R_{d1} = R_{d2} = 330\Omega$  use  $V_{dd} = 12V$ ,  $V_{ss} = -12V$ ,  $R_{S1} = R_{S2} = 220\Omega$ .

10



Use

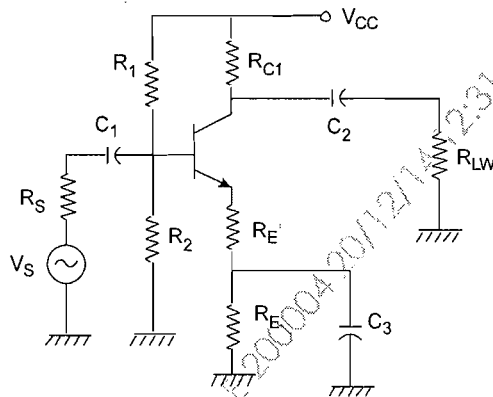
$$K_n = 400 \mu A / V^2$$

$$V_{TN} = 1 V$$

#### UNIT - IV

7. Calculate  $A_{mid}$ ,  $f_L$ ,  $f_H$  for C.E. amplifier if

20



Given

$$V_{CC} = 12V, C_1 = 1\mu F$$

$$C_2 = 0.1\mu F, C_3 = 2.2\mu F$$

$$R_{LW} = 100k\Omega, \beta = 100$$

$$f_T = 300 MHz, r_x = 300\Omega$$

$$C_{\mu} = 0.5 pF$$

$$Q_{point}(5V, 0.125 mA)$$

$$R_{C1} = 43k\Omega, R_{E'} = 3k\Omega$$

$$R_E = 10k\Omega, R_1 = 300k\Omega$$

$$R_2 = 100k\Omega, R_S = 100\Omega$$

OR

8. a) Explain method of finding  $W_L$  for common base amplifier.

10

b) Explain with short circuit time constant determination of  $W_L$  for common emitter amplifier.

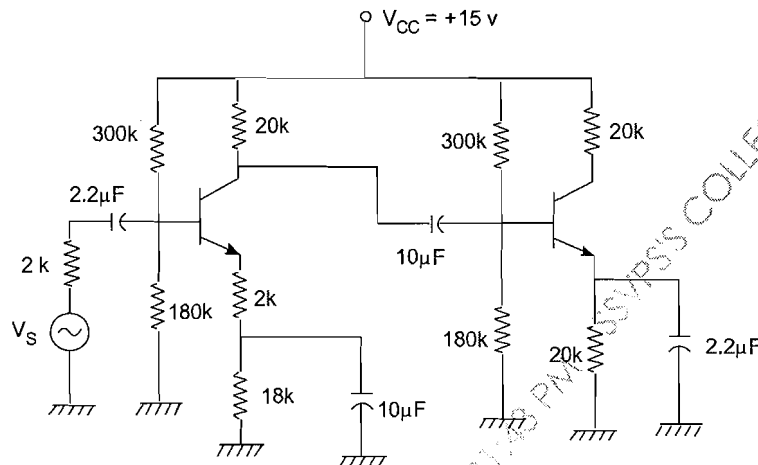
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## UNIT - V

9. a) Explain the method for solving cut off frequency (lower) for common collector amplifier. 10
- b) Derive the expression for higher cut off frequency (WH) for common emitter configuration amplifier. 10

OR

10. For the two stage amplifier calculate  $A_{mid}$ ,  $f_L$   
 Given  
 $\beta = 100$ ,  $V_A = 70V$   
 for  $T_1$  &  $T_2$   $C_{\pi 1} = 10\text{pf}$ ,  $C_{\pi 2} = 12\text{pf}$   
 $C_{\mu 1} = C_{\mu 2} = 1\text{pf}$ ,  $r_x = 250\ \Omega$



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Seat Number

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चमक - 056

## Electromagnetic Engineering (1020)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** sub-questions from each unit.
5. Figures to the right indicate full marks.
6. Draw neat diagrams wherever necessary.
7. Assume suitable data if necessary.

### UNIT - I

1. a) Derive the expression for  $\vec{E}$  at any general point P due to uniform charge distribution along an infinite straight line with uniform line charge density  $\rho_L$ . Also state the standard charge distribution. 10

- b) The spherical region  $0 < r < 10 \text{ CM}$ , contains a uniform volume charge density  $\rho_V = 5 \mu\text{C}/\text{m}^3$ . 10  
Find i) Total charge for  $0 < r < 10 \text{ cm}$   
ii)  $D_r$  for  $0 < r < 10 \text{ cm}$   
iv) The non - uniform charge density

$$\rho_V = \frac{-3}{(r^3 + 0.001)} \text{ n C}/\text{m}^3 \text{ exists for } 10 \text{ cm} < r < r_0 \text{ find } r_0,$$

so that the total charge  $0 < r < r_0$  is zero.

- c) find the workdone in moving a point charge  $q = 10 \mu\text{C}$  from the origin to  $(1, \pi/4, \pi/2)$  in the field 10

$$\vec{E} = 5r \hat{a}_r + \frac{10}{r \sin\theta} \hat{a}_\phi \text{ (V/m)}$$

## UNIT - II

2. a) Derive the boundary condition for boundary interface between two perfect dielectric material. 10

- b) The Potential field is  $V = \frac{(200 \sin \theta \cos \phi)}{r^2}$  volt 10

- i) Find the equation of the conductor surface on which  $V = 100V$ .  
 ii) Find  $E$  at point  $p (r, 30^\circ, 30^\circ)$  on the conductor surface.  
 iii) Find  $\rho_s$  at point  $P$ . Assume  $\epsilon = \epsilon_0$  adjacent to the surface.

- c) Two parallel conducting plates are of each 10 cm by 10 cm and separated by 2 mm. The region between the plates is filled with perfect dielectric for which  $\epsilon_r = (1 + 500x)^2$  where  $x$  is the distance from one plate. 10

Assume uniform surface charge density of  $10 \text{ nc/m}^2$  on the positive plate.

Determine

- i)  $\phi$  total  
 ii)  $D_x$   
 iii)  $E_x$   
 iv)  $V_0$   
 v) Capacitance.

## UNIT - III

3. a) Two identical circular loops of 1m. radius are situated side by side on common axis. The distance between the loops is 1 meter. If both loops carry a current of 1 Amp in the same direction find  $B$  at the center of one loop and of a point mid-way between the loops on their common axis. 10

- b) State Biot- savart law. Find magnetic field intensity  $\vec{H}$  due to an infinite conductor which is lying along  $z$ -axis and carrying a direct current  $I$  in positive  $Z$ -direction. 10

- c) Explain scalar and vector magnetic potential in detail. 10

## UNIT - IV

4. a)  $E = (-20ax + 30ay + 70az) \cos 10^6 t \text{ v/m}$  at point  $P(3, -4, 1)$  which lies on the surface of a perfect conductor. If the material adjacent to conductor, has  $\epsilon_R = 5$ ,  $\mu_R = 2$ , and  $\sigma = 0$ , find. 10
- i) Unit vector normal to the conductor surface at  $P$ .  
 ii) The surface charge density on the conductor surface at  $P$ .



- b) Write Maxwell's equation in differential form, integral form and phasor form. 10
- c) Derive expression for poynting vector. 10

## UNIT - V

5. a) Explain 10
- 1) Short dipole
  - 2) Yagi uda antenna
  - 3) Effective area
  - 4) pattern multiplication
  - 5) Directive Gain
- b) Define radiation resistance of an antenna. What is it's significance? Derive radiation resistance for short monopole. 10
- c) Calculate the power radiated by  $\lambda/12$  dipole in free space if it carries a uniform current of  $14 \cos wt$  amperes. Also calculate it's radiation resistance. 10

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चमक - 057

## Microprocessor & Microcontroller System (1040)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

### Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Assume suitable data if necessary.
7. Use non-programmable calculator only.

1. a) i) Differentiate microprocessor & microcontroller. 4  
ii) Draw the format of flag register of 8085. Explain each bit. 6  
b) Write an assembly language program to separate even numbers from the list of 50 numbers & store them in another list starting from 2300 H. Assume starting address of 50 numbers list is 2200 H. Also draw flow chart. 10  
c) Explain following instructions in detail. Write their addressing modes. 10  
i) XCHG. ii) XTHL.  
iii) POP rp. iv) SHLD.  
v) RAL.

2. a) i) Write addresses of following SFRs, P<sub>0</sub>, TCON, P<sub>1</sub>, SCON, P<sub>2</sub>, 7E, P<sub>3</sub>, SBUF. 4
- ii) Draw and explain memory organization of 8085. 6
- b) i) Explain stack pointer operation in 8051. 4
- ii) Write an assembly language program to convert 8 bit binary number into it's BCD equivalent. Draw Flow chart. 6
- c) Write an assembly language program & draw flow chart for arranging ten 8 bit numbers in ascending order. 10
3. a) Write an ALP to flash LED connected to P 1.0 at 0.5 sec rate. When line P<sub>2.0</sub> goes high. Use times 0 for generating delay. 10
- b) Draw and explain. 10
- i) TCON. ii) SCON.
- c) Write an assembly language program to transfer message
- i) "peace", serially at 9600 band rate, 8 bit data, 1 stop bit. 6
- ii) Discuss operating modes of serial Port of 8051. 4
4. a) Draw and explain 8255. Discuss it's Operating modes. 10
- b) Interface an 8 digit 7 segment LED display to 8051 through port 1 and port 3 and write an assembly language program to display the message. 10
- c) Interface DAC to 8051. Write an assembly language program to generate
- i) Square Wave. ii) Triangular Wave. 10
5. a) Discuss. 10
- i) PIC microcontroller.
- ii) Write features of PIC 16CXX5.
- b) Describe the following. 10
- i) Rs. 485. ii) Rs. 232.
- c) Explain in detail IEEE 488 standard. 10

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## Network Analysis & Synthesis (1050)

P. Pages : 4

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

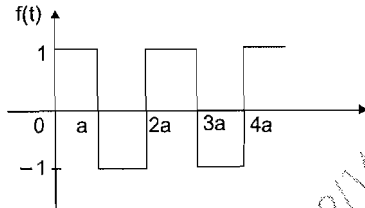
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** from each units.
5. Use of non-programmable calculator is allowed.
6. Assume suitable data if necessary.

### UNIT - I

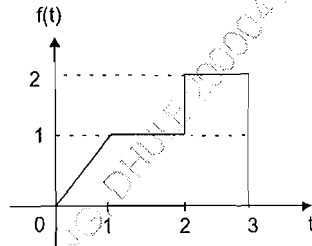
1. a) Determine the Laplace transforms of the following waveforms.

10

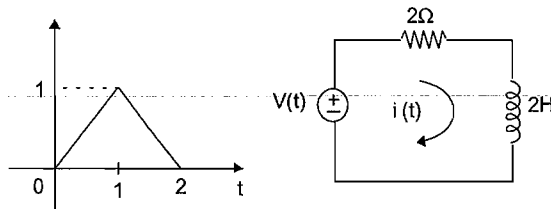
i)



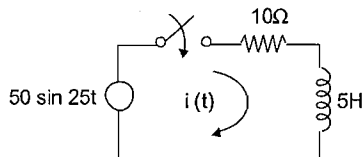
ii)



- b) A triangular pulse is applied to the  $R_L$  circuit as shown below. Determine the current response of the ckt. 10

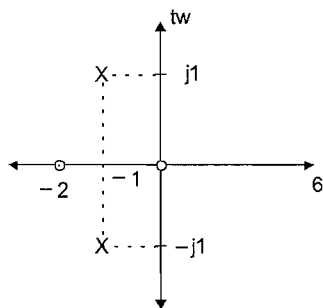


- c) Determine the current  $i(t)$  in the n/w. when switch is closed at  $t=0$  10



### UNIT - II

2. a) State and explain necessary conditions for the driving impedance functions. 10
- b) Obtain the admittance function  $Y(s)$  for which the pole zero diagram is shown below,  $Y(\infty) = 1$ . 10



- c) The voltage  $V(s)$  of a network is given by 10

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

Plot the pole-zero plot and hence obtain  $V(t)$  using graphical method.

### UNIT - III

3. a) What do you mean by Y parameters of two part network? Obtain its equivalent circuit and its equations in matrix form. What is condition of symmetry and reciprocity? 10

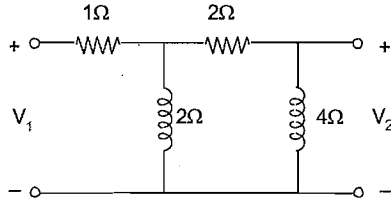
- b) Currents  $I_1$  and  $I_2$  entering at port 1 and port 2 respectively of a two port network are given by the following questions 10

$$I_1 = 0.5V_1 - 0.2V_2$$

$$I_2 = -0.2V_1 + V_2$$

Obtain Z and ABCD parameters of the network.

- c) Two identical sections of the network shown below are connected in parallel. Obtain the Y parameters of the combination. 10



#### UNIT - IV

4. a) Find the two foster realization of 10

$$Z(s) = \frac{4(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}$$

- b) Check the positive realness of the following functions. 10

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

ii)  $Z(s) = \frac{s^2 + 2s + 25}{(s+4)}$

- c) List the seven properties of positive real functions and also state necessary and sufficient conditions for positive real functions. 10

#### UNIT - V

5. a) Design a Butter worth LPF of first order with 10

i) Pass band gain of 10 dB and

ii) Cut off frequency of 1 KHZ.

- b) Show that the transfer function of the first order HPF is of the form. 10

$$\frac{A_v(s)}{AV_0} = \frac{1}{\left(\frac{\omega_0}{s} + 1\right)}$$

- c) Design a fourth order HPF for cut off frequency of = 5 KHZ and 10  
C = 0.01  $\mu$ f

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Seat Number

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चमक - 059

## Medical Electronics (1010)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Figures to the right indicate full marks.

### UNIT – I

1. Solve **any two**. 20
- a) Explain the electrophysiology in detail.
  - b) Write short note on :
    - i) Ultrasonic transducer.
    - ii) Isolation amplifier.
  - c) Explain the block diagram of digital storage oscilloscope.

### UNIT – II

2. Solve **any two**. 20
- a) Draw ECG waveforms and explain the same in detail.
  - b) Discuss need of defibrillator, draw the circuit of a defibrillator & explain it in detail.
  - c) Explain cardio tachometer in detail.

## UNIT – III

3. Solve **any two**. 20

- a) Discuss the placement of electrodes for EEG.
- b) What is EMG ? Draw and explain preamplifier circuit for EMG machine.
- c) Explain central nervous system in detail.

## UNIT – IV

4. Solve **any two**. 20

- a) Explain Radiographic technique.
- b) Write short note on Oximetry.
- c) List respiratory measurement. Explain infrared gas analyzer in detail.

## UNIT – V

5. Solve **any two**. 20

- a) Explain ultrasound in medicine in detail.
- b) Explain the production of X rays.
- c) Write short note on :
  - i) PET.
  - ii) SPECT.

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चमक - 060

## Feedback Control System (1030)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

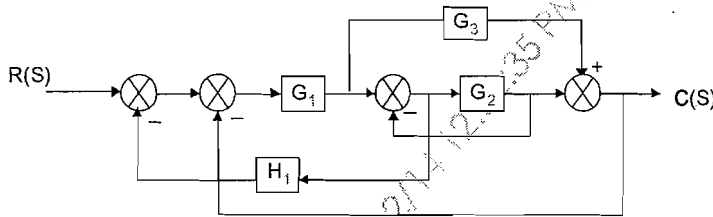
Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** question from each unit.
5. Assume suitable data if necessary.
6. Use of non programmable calculator is allowed.
7. Figures to the right indicate full marks.

### UNIT - I

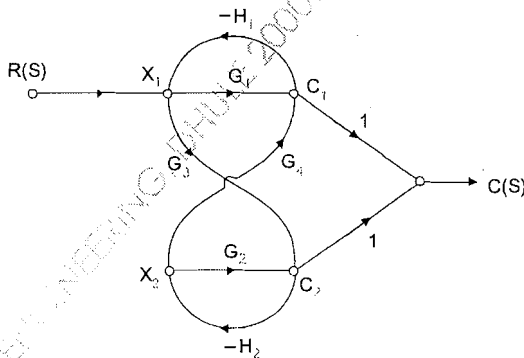
1. a) Find the transfer function for the block diagram given.

10



- b) Obtain transfer function for the SFG.

10



चमक - 060

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- c) Draw and explain block diagram of open loop and closed loop system also compare the advantages and disadvantages of the system. 10

## UNIT - II

2. a) For unity F.b. system  $G(S) = \frac{200}{S(S+8)}$ ;  $\gamma(t) = 2t$  determine steady state error. If it is desired to reduce this existing error by 5%. Calculate new value of gain of the system. 10
- b) Using Routh's criterion, obtain stability of the following equation. 10
- i)  $S^6 + 3S^5 + 5S^4 + 9S^3 + 8S^2 + 6S + 4 = 0$ .
- ii)  $S^4 + 8S^3 + 24S^2 + 32S + 16 = 0$
- c) Explain in details. 10
- i) Synchros.
- ii) Stepper motor.

## UNIT - III

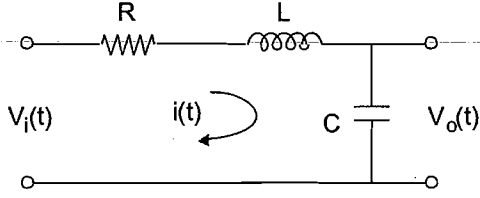
3. a) i) Obtain break away point of the function. 5
- $$G(S)H(S) = \frac{K(S+5)}{S^4 + 4S + 20}$$
- ii) Explain the step for construction of Root locus. 5
- b) Given  $G(S)H(S) = \frac{K}{S(S+2)(S^2 + 6S + 13)}$  10
- Draw the root locus and comments on stability.
- c) Draw the root locus and mark the salient points for f.b. system. 10
- $$G(S)H(S) = \frac{K(S+4)}{S(S+2)(S+6)(S+8)}$$

## UNIT - IV

4. a) For unity F.B. system 10
- $$G(S) = \frac{242(S+5)}{S(S+1)(S^2 + 5S + 121)}$$
- Sketch the bode plot find  $w_{ge}$ ,  $w_{pc}$ ,  $G_m$  and  $PM$  and comment on stability.
- b) Explain the frequency domain specifications. 10
- c) State and explain the Nyquist stability criterion. 10

## UNIT - V

5. a) Obtain the state model of the given electrical system in standard form. Given at  $t = t_0$ ,  $i(t) = i(t_0)$  and  $v_0(t) = v_0(t_0)$ . 10



- b) Write short note on :

- Fuzzy logic control.
- PID controller.

- c) Find the STM of the state equation 10

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} U,$$

using the inverse transform method.

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Subject विषय : Electronic Circuit Design

-YHB-55A

Time एकूण वेळ : 3 Hrs

Total marks एकूण गुण : 100

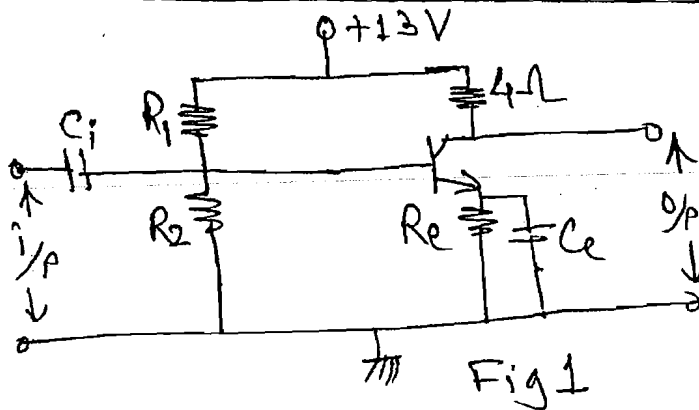
Instructions सूचना :

- 1) Attempt any two subquestions from each unit
- 2) Assume suitable data wherever necessary and state the assumptions made
- 3) Diagrams/sketches should be given wherever necessary
- 4) Use of logarithmic table, drawing instruments and non-programmable calculator is permitted.
- 5) Figures to right indicate full marks.

Q.No. प्रश्न क्र.		Marks गुण
1 (a)	It is desired to obtain 24 V constant voltage at 1 Amp current from $50V \pm 10\%$ unregulated input voltage. Design a suitable series voltage regulator and find out the stability factor of circuit designed by you.	10
(b)	Design an unregulated power supply having maximum TUF and capacitive filter to provide d.c. output of 240 V at 100 mA with rms value of ripple voltage not to exceed 240 mV at full load condition. Find out rms value of ripple voltage, if load current of the circuit is doubled.	10
(c)	(i) Draw the block diagram of switching regulator and explain its operation in brief	5
	(ii) Design an adjustable voltage regulator using three terminal IC LM317 to provide 5V to 10 V variable output voltage at load current of 1 Amp. Assume Adjustment Pin Current $I_{ADJ} = 100 \mu A$ , $R_1 = 240 \Omega$ .	5

Q.No. प्रश्न क्र.	Unit II	Marks प्र
2(a)	<p>Explain in brief, voltage divider biasing and state its advantages over fixed biasing. Design such circuit for common emitter amplifier which uses a Si transistor having <math>h_{FE} = 100</math> and required operating point is <math>V_{CEQ} = 10V</math>, <math>I_{CQ} = 5mA</math>. Assume <math>V_{CC} = 22.5V</math>.</p> <p>(b) Explain four types of negative feedback with block diagrams. What is the effect of negative feedback in each case on the performance parameters of an amplifier circuit.</p> <p>(c) Design a two stage RC coupled common emitter audio frequency amplifier to meet the following specifications.</p> <p><math>R_L = 1k\Omega</math>, <math>R_S = 1k\Omega</math>, <math>V_o</math> peak to peak = 9V,  <math>V_{CC} = 15V</math>, Si transistor having <math>h_{ie} = 1k</math>, <math>h_{fe} = 100</math>          (Assume Coupling capacitors are large and no need to calculate)</p>	10  10  10
3(a)	<p style="text-align: center;">Unit III</p> <p>Find out the values of <math>R_1</math>, <math>R_2</math> and <math>R_E</math> of circuit shown in fig 18 so that output power is 5W across load when operating point is selected at the centre of load line. Find out the specifications of transistor and efficiency of the circuit.</p>	10



Q.N.O.  
प्रश्न क्र.Marks  
गुण

(b) (i) What is class B power amplifier? Find out expression for its efficiency. 5

(ii) Explain in brief the design steps of class B audio power amplifier. 5

(c) Design audio power amplifier using LM 380 for the following specifications. 10

Peak to peak o/p voltage = 8V,  $P_o = 2W$ ,  $A_v = 50$

#### UNIT - IV

4(a) (i) Find out component values of timing circuit of an astable multivibrator which can generate square wave signal of 1KHz frequency and 40% duty cycle. 5

(ii) Find out component values of tank circuit of transistorised Colpitt's Oscillator which uses transistors with  $h_{ie} = 1K$ ,  $h_{fe} = 100$  and generates sine signal of 5MHz for  $R_L = 1K$ . Draw the Circuit. 5

Q.No.  
प्रश्न क्र.Marks  
गुण

4(b) Design a single tuned amplifier using FET for the following requirements -

$$A_v = 100, f_o = 1 \text{ MHz}, Q_{eff} = 15, R_i = 1.2 \text{ M}\Omega.$$

Assume  ~~$I_{DSS} = 7 \text{ mA}$~~ ,  $V_{DSQ} = 8 \text{ V}$ ,  $V_{DD} = 20 \text{ V}$ ,  
 $I_{DQ} = 3.5 \text{ mA}$ ,  $I_{DSS} = 7 \text{ mA}$ ,  $V_p = -6 \text{ V}$ ,  $g_{m0} = 5 \text{ mS}$ ,  
 $r_d = 50 \text{ k}\Omega$ .

10

4(c) Interpret the circuit shown in fig 2. Find out various currents and voltages of the circuit when  $Q_1$  is off and  $Q_2$  is ON.

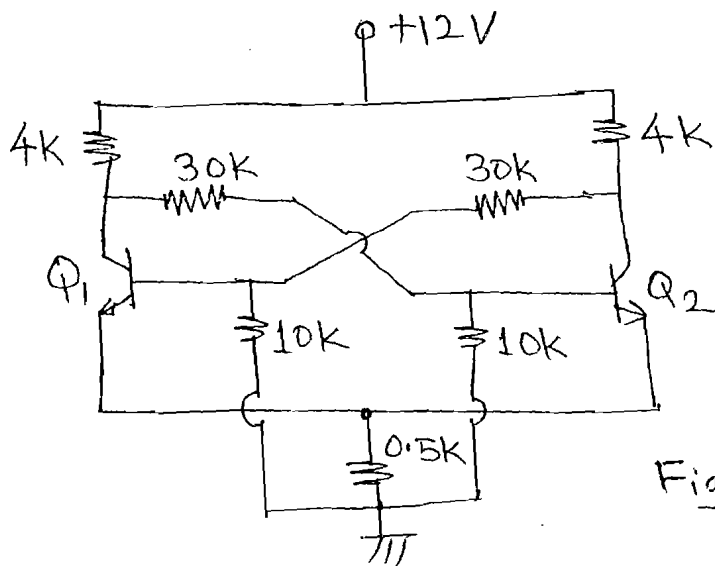


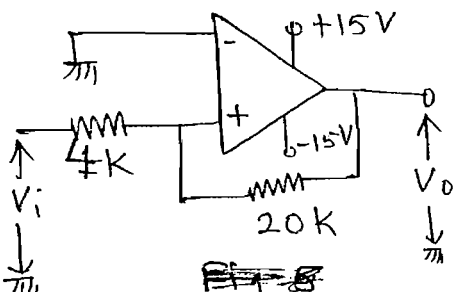
Fig 2

10

## UNIT V

5a(i) Define V-I convertor and list its basic requirements. Draw V-I convertor for floating load and explain its operation.

5

Q. No. प्रश्न क्र.		Marks गुण
	(ii) Design an inverting amplifier using op-amp 741 with single power supply to provide $A_{vf} = -10$ , <del><math>I_{NA}</math></del> and $f_L = 30 \text{ Hz}$ .	5
(b)	Design 2 <sup>nd</sup> order Butterworth's Low Pass Filter having cut off frequency $f_c = 1 \text{ kHz}$ . Suggest suitable modification in the circuit to make it's gain as one	10
(c)	Sketch the output waveform for the circuit shown in fig 3, if $5 \text{ V rms}$ , <del>same as</del> $1 \text{ kHz}$ frequency sine signal is applied at its input. Assume ideal op-amp	5
	 <p style="text-align: center;">Fig 3</p>	
	(ii) Write a short note on - "Peak to Peak Detector using comparator."	5

