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Microcontrollers & Peripheral Interface Controller (185103/235103)

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. Figures to right indicate full mark. Draw flow chart and write comment where requires.
6. Use of non programmable calculator is allowed.
7. Assume suitable data if necessary.

UNIT - I

1. a) Draw and explain block diagram of 8051. 8
- b) i) Explain dual role of port 3. 4
- ii) A switch is connected to pin P1.0 and LED to Pin P2.7. Write a program to get the status of the switch and send it to the LED. 4
- c) i) Explain PSW register of 8051. 4
- ii) Explain the function of stack & stack pointer. 4

UNIT - II

2. a) Explain addressing modes of 8051 uc with suitable examples. 8
- b) i) In a semester a student has to take five courses. The marks of the student (out of 25) are stored in RAM locations 50H onwards. Find the average marks and o/p it on port 1. 4
- ii) Explain Rotate instructions. 4

- c) Assume that register A has packed BCD. Write a program to convert packed BCD to two ASCII numbers and place them in R2 and R6. 8

UNIT – III

3. a) Write a program for counter 1 in mode 2 to count the pulses and display the state of TL1 count on port 2. Assume that clock input is connected to T1 pin (P3.5). 8
- b) i) Give the steps for programming 8051 to receive data serially. 4
- ii) Explain interrupt vs polling. 4
- c) Explain TCON and PCON register structure. 8

UNIT – IV

4. a) Draw interface diagram of 8051 with stepper motor. Write a program to rotate a motor 64° in a clockwise direction. The motor has a step angle of 2° . Use the normal 4-step sequence. 8
- b) Write a note on : 4
- i) I2C bus protocol. 4
- ii) MODBUS protocol. 4
- c) Write on ALP to generate sine wave using DAC0808. Also show its interfacing. 8

UNIT – V

5. a) Explain status register, FSR, PCLATCH and PCL of PIC 16C6x/7x. 8
- b) Write a note on : 4
- i) PIC 16 F 8xx flash microcontroller. 4
- ii) Interrupts in PIC. 4
- c) Explain PIC memory organization. 8

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Communication System - II (185102/235102)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

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3. Students should note, no supplement will be provided.
4. Attempt **any two** from each unit.
5. Assume suitable data if necessary.

UNIT I

1. a) State & prove Rayleigh's energy theorem. 8
- b) Define Power spectral density explain its properties. 8
- c) i) Write short note on Guassian distribution. 4
- ii) A perfect cube die is thrown find probability that 4
 - i) an even number is up.
 - ii) an perfect square is up.

UNIT II

2. a) Draw & explain Delta modulation, which are the errors in DM. How they can be eliminated. 8
- b) Draw the line codes for the data 1011010. 8
- c) Explain AT & T hierarchy for multiplexing. 8

UNIT III

3. a) Draw & explain BFSK transmitter & Receiver. 8
 b) Explain QPSK transmitter with neat waveform. 8
 c) With detail derivation & block diagram explain BPSK reception. 8

UNIT IV

4. a) DMS emits the symbols with probability {16/32, 4/32, 4/32, 2/32, 2/32, 2/32, 1/32, 1/32}. Find code vectors using Shannon fano encoding & verify the source coding theorem. 8
 b) Use Huffman encoding for the symbols with probabilities {0.37, 0.33, 0.16, 0.07, 0.04, 0.02, 0.01} verify the source coding theorem. 8
 c) A DMS transmits messages x_1 & x_2 with probability $3/4$ & $1/4$. Calculate all entropies & mutual information if $p(y/x) = \begin{bmatrix} 2/3 & 1/3 \\ 1/3 & 2/3 \end{bmatrix}$. 8

UNIT V

5. a) The generator matrix of Hamming code is 8

$$GCP = \left[\begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & 1 & 0 & 1 & \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 & \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 & \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & \end{array} \right]$$

 Find
 i) All code vectors.
 ii) Weight of each code.
 iii) Minimum distance.
 iv) No of errors can be detected & corrected.
 b) The generator polynomial of (7,4) cyclic code is $g(p) = P^3 + P + 1$. 8
 Find code vectors for
 i) 1100 ii) 0101
 iii) 0111 iv) 1110
 c) Explain ARQ schemes with neat diagram. 8

Seat Number

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चपळ - 043

Electromagnetic Engineering
(185105/235105)

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. Assume the suitable data if necessary.
5. Use of non-programmable Calculator is allowed.
6. Solve **any Two** Questions from each unit.

UNIT I

1. a) Explain the Coulomb's Force Law. 4
b) Explain the Electric field Intensity. 4
2. a) A point charge $Q=22 \text{ nC}$ is placed at the Origin in Cartesian Co-ordinate system. Find the electric flux density at point $p(1, -2, -4)\text{m}$. 4
b) Calculate \vec{E} at $Q_2 = (3, 4, -2)$ in free space Caused by a charge $Q_1 = 3 \mu\text{C}$ at $(0, 0, 0)$ m. 4
3. Derive the expression for Electric field Intensity due to Line charge distribution in Cartesian Co-ordinate system. 8

UNIT II

1. a) Explain the Gauss's Law. 4
b) Explain the Electric potential. 4
2. Derive the expression for Divergence Theorem. 8

3. a) A point charge of 10 nc is placed at the origin of Cartesian Co-ordinate system. While another point charge of 12 nc is placed-at (-1, -2, 3). Find the potential at point (-1, -2, 3). 4
- b) A scalar potential is given by, $v = 5x + 4y^2 + 2z^3$ then find \vec{E} at (2, 3, 4). 4

UNIT III

1. Derive the expression for Poisson's and Laplace's Equations. 8
2. A pair of 200 mm long Concentric Cylindrical Conductors of radii 50 and 100 is filled with dielectric $= 8\epsilon_0$. A voltage is applied between the Conductors to establish an electric field $\vec{E} = \frac{3\pi \times 10^5}{r} \hat{a}_r$ V/m between the Cylinders. Determine the Capacitance and applied voltage between two Cylinders. 8
3. Explain the Concept of Current density and Continuity of Current. 8

UNIT IV

1. a) Explain the Biot - Savarts Law. 4
- b) Explain the Ampere's Circuital Law. 4
2. Derive the Expression for Stoke's Theorem. 8
3. Find the magnetic field about a long straight wire Carrying Current I using magnetic vector potential. 8

UNIT V

1. Give the Maxwell's equations (1 to 4) in Integral form. 8
2. Derive the expression of Poynting's Theorem. 8
3. Define & Explain the following. 8
 - a) Directive gain.
 - b) Radiation Intensity.
 - c) Antenna Aperture.
 - d) Power gain.

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Electronic Circuit Design (185101/235101)

P. Pages : 6

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. Each question carries equal marks.
5. Assume suitable data, if requires.
6. Use of non programmable calculator is allowed.
7. Unless specified for transistor and diodes, make of device is Silicon (Si).
8. Unless specified, use $V_{BE} = 0.7V$ & $V_{CE sat} = 0.2V$ wherever required.
9. Unless specified in question, use data information given at the end of question paper.

UNIT - I

1. Solve **any two**.

8

a) Design series voltage regulator circuit for

i) Regulated output voltage $V_L = 12V$ ii) Load current $I_L = 125mA$ iii) Input voltage of regulator is $V_{in} = 20 \pm 2V$

Draw the designed circuit diagram. Design must include calculation of component values, calculation of maximum ratings of transistor, zener diode.

[No need of design of unregulated power supply and any protection circuit].

- b) Design a regulated power supply using LM 317 for output voltage $V_0 = +1.2$ to $+5V$ with load current $I_L = 200mA$ at $25^\circ C$, with bridge rectifier and $V_{r(pp)}$ for filter capacitor is $1V$ Draw the circuit diagram design should include calculation of all external components for LM 317, heatsink requirement (if any), and design of unregulated power supply. (Use AC mains $230V/50Hz$). 8
- c) Design a buck type switching regulator using LM 2575 for following specifications. 8
- Input voltage $V_{in} = 15V$
 - Output voltage $V_0 = 5V$
 - Load current $I_{Lmax} = 700mA$
 - $T_A = 60^\circ C$
 - $OL = 25\% I_{Lmax}$
 - Operating frequency = $52 KHz$.
- Draw the designed circuit diagram. Design must include calculation of external component values and heatsink requirement. (no need of design of unregulated part of power supply)

UNIT – II

2. Solve any two.

8

- a) Design a single stage CE amplifier with emitter resistor fully by passed for following requirements.
- Voltage Gain $A_v \geq 100$
 - Stability factor $S = 6$
 - Q points ($1mA$, $3V$)
 - Input resistance $R_i = 5K\Omega$
 - Lower cut off frequency $F_L = 20Hz$
 - Load resistance $R_{LW} = 100K\Omega$, source resistance $R_S = 600\Omega$,

Use transistor (BJT) with $h_{fe_{min}} = 200$, $h_{ie} = 10K\Omega$.

Design must include calculation of bias components and external capacitors.

- b) Design common Drain Amplifier using N – JFET for following requirements. 8

- i) Peak output voltage $V_{OP} = 2.5V$
- ii) Load resistance $R_{LW} = 100K\Omega$,
- iii) Input resistance $R_i = 2 M\Omega$,
- iv) Output resistance $R_{out} \leq 750\Omega$,
- v) Source resistance $R_{source} = 50\Omega$,
- vi) Use potential divider network
- vii) Use $I_D = I_{DSS}/2$

For JFET use

$$I_{DSS} = 4mA, V_P = -6V, r_d = 50K\Omega,$$

[No need of calculation of coupling capacitors]

- c) Design single stage CE amplifier (partially bypass) for 8

$$A_v \geq 25, I_{CQ} = 1mA, V_{CEQ} \geq 5V, S = 10$$

$$R_i = 10K\Omega, R_{LW} = 100K\Omega, R_S = 0.6K\Omega, f_L = 20Hz$$

$$\text{Use } R_C = R_{LW}/10$$

For BJT use $h_{fe} = 200, h_{ie} = 10K\Omega$

UNIT - III

3. Solve any two. 8

- a) Design a transformer coupled class. A power amplifier to meet following requirements.

- i) output power $P_0 = 2W$
- ii) stability factor $S = 11$
- iii) load resistance $R_L = 4\Omega$
- iv) $V_{CC} = 12V$
- v) Output transformer efficiency $\eta = 70\%$
- vi) transistor $h_{fe} = 40$

[Use voltage across emitter resistor $(R_E) = 2V_{BE}$]

Design a circuit to obtain maximum efficiency.

- b) Design a class B push pull transformer coupled amplifier to supply 4 W of output power to $16\ \Omega$ load. Available power supply $V_{CC} = 30V$. 8

Efficiency of output transformer is 80%, use $S = 11$, $R_s = 600\ \Omega$, voltage drop across emitter resistor $V_{RE} = 0.7V$.

Design must include calculation of all component values, selection of transformers, maximum ratings of transistor.

- c) Design a tuned amplifier circuit using BJT as an active element for – 8

i) Resonant frequency $f_0 = 3MHz$

ii) Bandwidth = 200 KHz.

iii) Overall voltage gain $A_{vs} = 80$

iv) Input resistance $R_i = 10K\Omega$

v) Stability factor $S = 8$

vi) $V_{CC} = 15V$, $I_{CQ} = 1mA$

vii) Source resistance $R_S = 50\Omega$, load resistance $R_{LW} = 100K\Omega$

Use potential divider bias network.

BJT used have $h_{fe} = 100$, $h_{ie} = 12K\Omega$, $r_o = 150K\Omega$, $C_o = 2pf$

[No need to calculate coupling and by pass capacitors]

UNIT – IV

4. Solve any two.

8

- a) Design RC phase shift oscillator using BJT for following requirements.

i) Output frequency $f_0 = 10KHz$

ii) Use $V_{CC} = 12V$, stability factor $S = 10$

iii) Q points for transistor (4V, 1mA)

iv) Select $R_C/R = 1$

v) Select voltage drop across emitter resistor (R_E) = $2V_{BE}$

vi) For BJT $h_{fe_{typ}} = 120$, $P_{Dmax} = 450mw$, $h_{ie} = 4.5K\Omega$

Design must include transistor selection, selection of bias components, selection of feedback network components.

- b) Design collector coupled monostable multivibrator to provide pulse width of $300\mu\text{sec}$, which operates from $\pm 5\text{V}$ supply. Transistor collector current $I_C = 1\text{mA}$ and transistor used have $h_{fe_{\min}} = 50$.
[No need to calculate speed up capacitor] 8
- c) Design transistorised Schmitt trigger circuit to have $UTP = 5\text{V}$, $LTP = 3\text{V}$. The two silicon transistors used have $h_{fe_{\min}} = 100$ and $I_C = 2\text{mA}$ use $V_{CC} = 12\text{V}$. 8

UNIT – V

5. Solve any two. 8

- a) Design FSK modulator using IC 555 to produce mark frequency as 1070 Hz and space frequency as 1270 Hz . Available power supply $V_{CC} = 5\text{V}$, use $C = 0.1\mu\text{f}$, $R_B = R_A \parallel R_C$ transistor used have $h_{fe_{\min}} = 70$.
[R_A and R_B are resistors connected to IC 555, R_C is resistor connected to collector of transistor]. 8
- b) Design V to F converter circuit using IC 9400, for output frequency $f_0 = 5\text{KHz}$ when input voltage $V_i = 5\text{V}$. If input V_i vary between 10 mV to 10 V and $V_{DD} = -V_{SS} = 5\text{V}$. Draw designed of all external component values.
[Use $C_{INT} = 5C_{ref}$] 8
- c) Design non inverting amplifier using $+ 5\text{V}$ supply with ac gain of 15, lower cut off frequency $f_L = 20\text{Hz}$ and input $Z_i \geq 100\text{K}\Omega$. Draw the designed circuit Diagram. Design must include calculation of all component values.
Data Information :
Transistor
BD227(PNP) $h_{fe_{\min}} = 40$, $P_{D_{\max}} = 12.5\text{W}$ $I_{C_{\max}} = 3\text{A}$
ECN100(NPN) $h_{fe_{\min}} = 50$, $P_{D_{\max}} = 5\text{W}$ $I_{C_{\max}} = 0.7\text{A}$
BC547(NPN) $h_{fe_{\min}} = 200$, $P_{D_{\max}} = 250\text{mW}$ $I_{C_{\max}} = 0.1\text{A}$ 8

Zener Diode :

BZZ14 $V_z = 5.6V$, $I_z(m) = 20mA$, $r_z = 4.5\Omega$

BZZ16 $V_z = 6.8V$, $I_z(m) = 20mA$, $r_z = 2\Omega$

Schottkey Diode :

1N5818 $I_{forward} = 1A$, $V_{reverse} = 30V$

For LM 317

| $T_j^\circ C$ | $\theta_{JA}^\circ C/w$ | $\theta_{JC}^\circ C/w$ | $\theta_{CS}^\circ C/w$ | drop out voltage (V) |
|---------------|-------------------------|-------------------------|-------------------------|----------------------|
| 150 | 35 | 2.3 | 2 | 2 |

For LM 2575 :

| $T_j^\circ C$ | $\theta_{JA}^\circ C/w$ | $\theta_{JC}^\circ C/w$ | $\theta_{CS}^\circ C/w$ | $I_{quiescent}$ | V_{sat} |
|---------------|-------------------------|-------------------------|-------------------------|-----------------|-----------|
| 150 | 65 | 2.3 | 2 | 12mA | 0.3V |

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चपळ - 045

Feedback Control System (185104 / 235104)

P. Pages : 3

Time : Three Hours

Max. Marks : 80

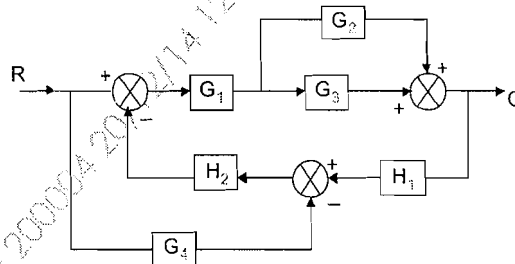
Instructions to Candidates :

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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. Figure to the right indicate full marks.
5. Use of non programmable calculator only.
6. Assume suitable additional data if necessary.
7. Attempt **any two** question from each unit.
8. Neat diagram must be drawn wherever necessary.

UNIT - I

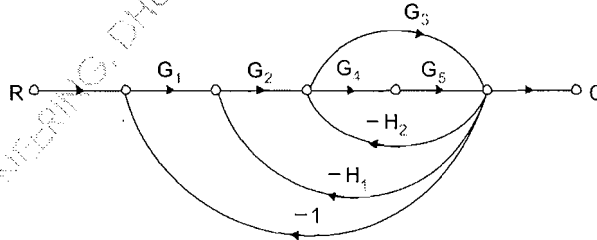
1. Answer **any two**.

- a) State the difference between open loop & close loop system. 8
- b) Calculate transfer function of block diagram given below.



- b) Calculate transfer function SFG shown.

8



चपळ - 045

UNIT – II

2. a) Draw the transient response specification for design considerations & define the terms. 8
- i) Delay time ii) rise time
 iii) peak overshoot iv) peak time
 v) settling time.
- b) A feedback control system describe by transfer function 8
- $$G(S) = \frac{K}{S^2(S+20)(S+30)}, H(S) = 1$$
- Determine steady state error coefficient and also determine the value of k to limit the steady state error to 10 unit due to input $r(t) = 1 + 10t + 20t^2$
- c) By using Routh criterion obtain stability for system given as
- i) $S^4 + S^3 + 2S^2 + 2S + 3 = 0$ 4
- ii) $S^6 + 3S^5 + 5S^4 + 9S^3 + 8S^2 + 6S + 4 = 0$ 4

UNIT – III

3. a) Sketch the complete root locus of system having 8
- $$G(S) \cdot H(S) = \frac{k(S+2)}{S^2 + 2S + 3}$$
- b) Sketch the complete root locus of system having 8
- $$G(S) \cdot H(S) = \frac{k}{S(S+2)(S+3)}$$
- c) Explain the effect of addition of poles and zeros on root locus. 8

UNIT – IV

4. a) Define and explain following terms : 8
- i) Gain margin ii) Gain crossover frequency.
 iii) Phase margin iv) Phase crossover frequency.

- b) Sketch bode plot showing magnitude in d/3 & phase angle in degree 8
for T.F. given below $\frac{2000}{S(S+2)(S+100)}$.

Also determine gain crossover frequency, phase crossover frequency, gain margin & phase margin.

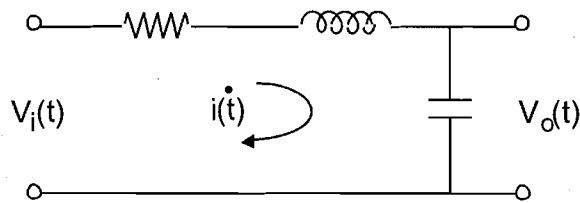
- c) State & explain the step to solve the Nyquist plot with example. 8

UNIT – V

5. a) i) Give advantages of state space approach. 4

ii) Define state variable and state vector. 4

- b) Obtain state model of given electrical network. 8



- c) Obtain the state model for system described by 8

$$T(S) = \frac{Y(S)}{U(S)} = \frac{1}{S^3 + 6S^2 + 10S + 5}$$

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चमक - 052

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

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| 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

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| 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

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| 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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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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Electronics Circuit Design (1090)

P. Pages : 5

Time : Three Hours

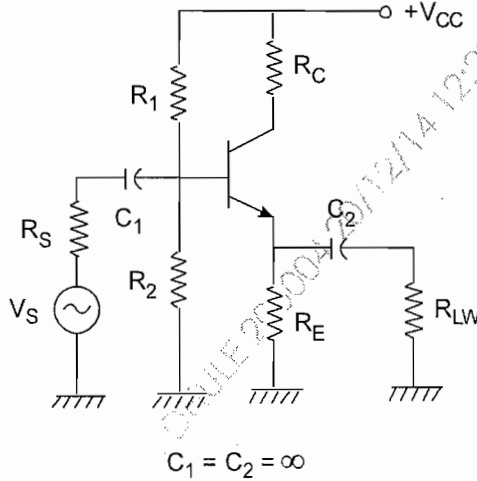
Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
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 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.

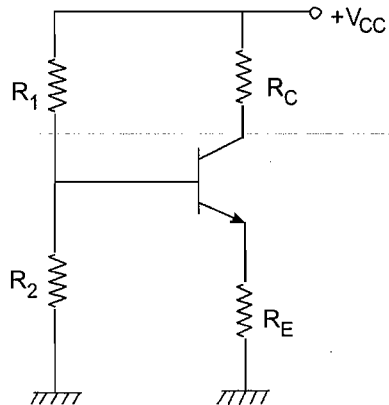
UNIT – I

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



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

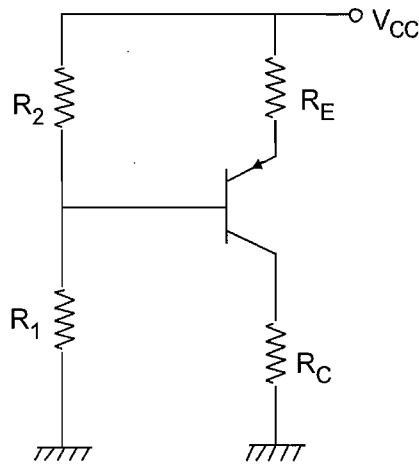
- b) Find the operating point for the following voltage divider network. 10



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

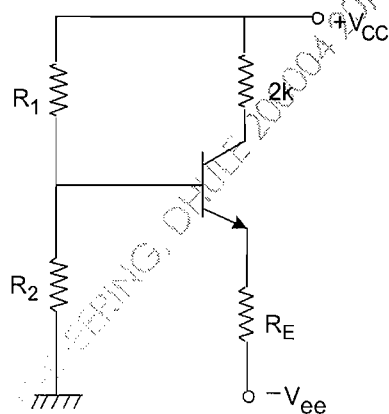
OR

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



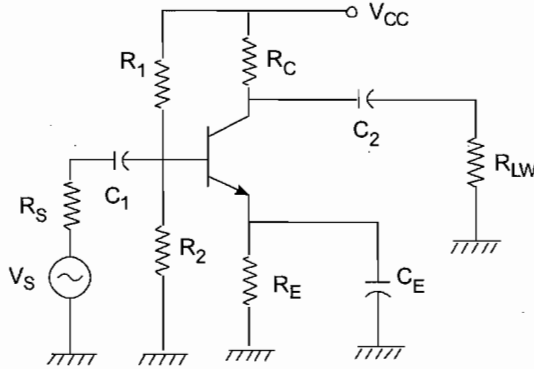
Given
 $V_{CC} = V_{ee} = \pm 18V$
 $\beta = 125$
 $R_C = 2k\Omega$
 $R_E = 4.7k\Omega$
 $R_1 = 100k\Omega$
 $R_2 = 51k\Omega$

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



Given

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

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

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

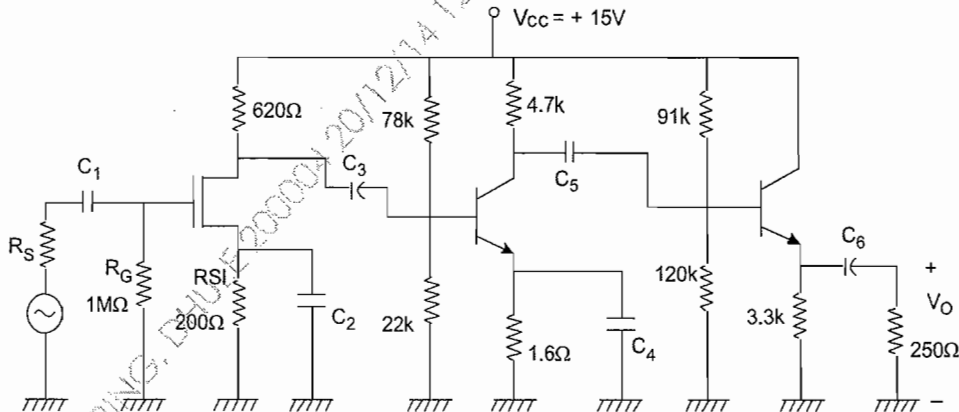
$$R_1 = 30 \text{ k}\Omega$$

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

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

UNIT – III

5. a) Calculate A_V , A_I , R_I & R_O for the following multistage amplifier. 20
- M_1 $K_n = 100 \text{ mA/V}^2$ $V_{TN} = -2V$, $\lambda = 0.02 \text{ V}^{-1}$
- T_2 $\beta_f = 150$, $V_A = 80V$, $V_{BE} = 0.7V$
- T_3 $\beta_f = 80$, $V_A = 60V$, $V_{BE} = 0.7V$

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

OR

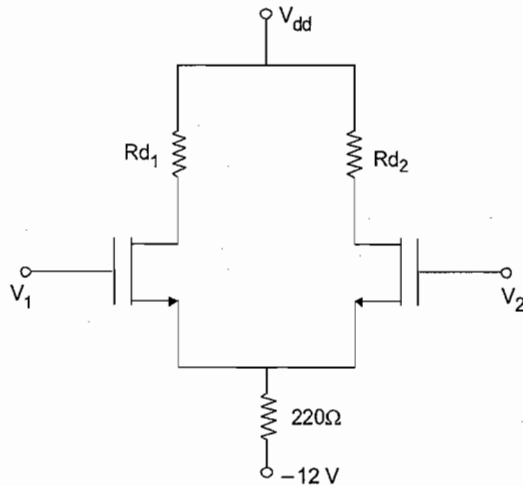
6. a) Write short notes on :

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

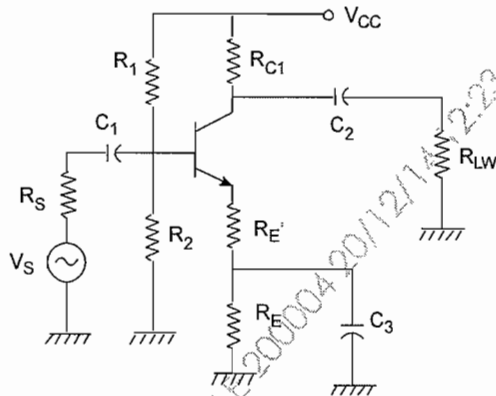
$$K_n = 400 \mu A / V^2$$

$$V_{TN} = 1 V$$

UNIT - IV

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

20



Given

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

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

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

$$f_T = 300 \text{ MHz}, r_x = 300\Omega$$

$$C_\mu = 0.5 \text{ pf}$$

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

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

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

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

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. 10

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

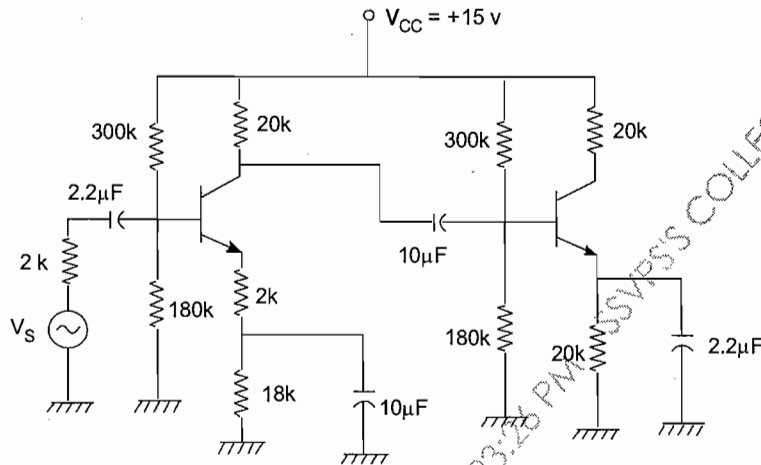
OR

10. For the two stage amplifier calculate A_{mid} , f_L
 Given

$$\beta = 100, V_A = 70V$$

$$\text{for } T_1 \& T_2 \quad C_{\pi 1} = 10\text{pf}, C_{\pi 2} = 12\text{pf}$$

$$C_{\mu 1} = C_{\mu 2} = 1\text{pf}, r_x = 250 \Omega$$



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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 ρ_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 $0 < r < 10 \text{ cm}$
iii) Dr 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
$$\vec{E} = 5r \hat{a}_r + \frac{10}{r \sin\theta} \hat{a}_\phi (\text{V}/\text{m})$$

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 ρ_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 nc/m^2 on the positive plate.

Determine

- i) ϕ 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, P₀, TCON, P₁, SCON, P₂, 7E, P₃, 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_{2.0} 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 :

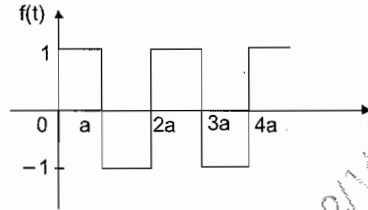
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** from each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

UNIT - I

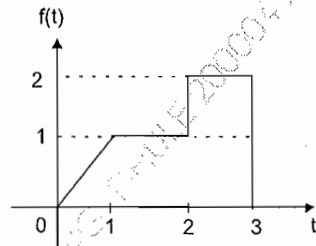
1. a) Determine the Laplace transforms of the following waveforms.

10

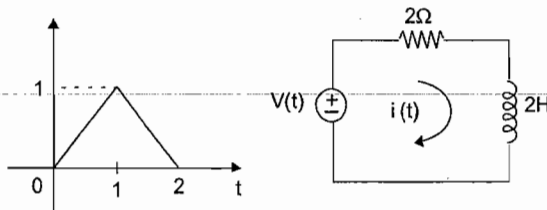
i)



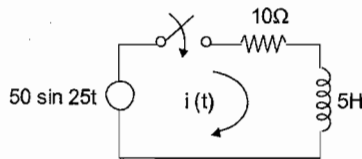
ii)



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

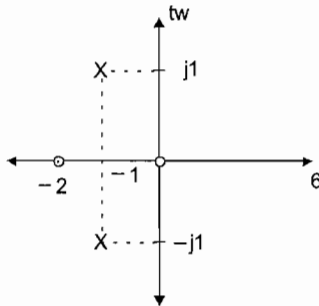


- c) Determine the current $i(t)$ in the n/w. when switch is closed at $t=0$ 10



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

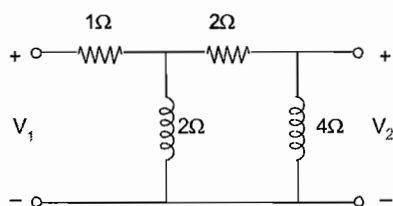
- b) Currents I_1 and I_2 entering at port 1 and port 2 respectively of a two port network are given by the following questions 10

$$I_1 = 0.5V_1 - 0.2V_2$$

$$I_2 = -0.2V_1 + V_2$$

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 Butterworth 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 $C = 0.01 \mu f$ 10

Seat Number

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चमक - 060

Feedback Control System (1030)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

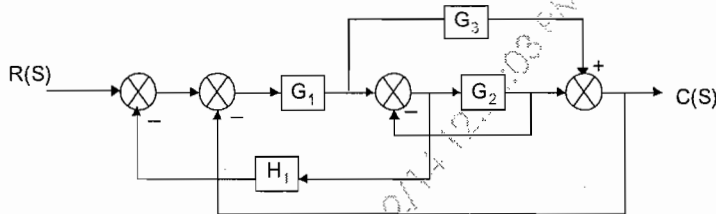
Instructions to Candidates :

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

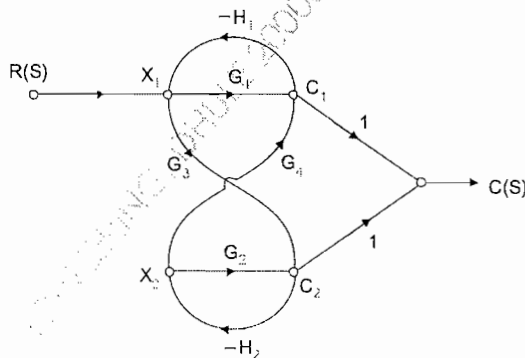
1. a) Find the transfer function for the block diagram given.

10



- b) Obtain transfer function for the SFG.

10



चमक - 060

- 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

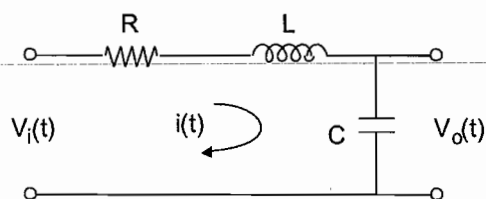
3. a) i) Obtain break away point of the function. 5
- $$G(S)H(S) = \frac{K(S+5)}{S^4 + 4S + 20}$$
- ii) Explain the step for construction of Root locus. 5
- b) Given $G(S)H(S) = \frac{K}{S(S+2)(S^2 + 6S + 13)}$ 10
- Draw the root locus and comments on stability.
- c) Draw the root locus and mark the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

- i) Fuzzy logic control.
- ii) PID controller.

- c) Find the STM of the state equation 10

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

using the inverse transform method.

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Power Electronics (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. Solve **any two** sub question from each unit.
5. Assume suitable data if necessary.

UNIT - I

1. a) Draw & Explain two transistor model of SCR define Latching & Holding current. 10
- b) Explain synchronised UJT relaxation oscillator circuit for triggering SCR & derive equation for output frequency. 10
- c) Explain structure & characteristics of IGBT. 10

UNIT - II

2. a) A single phase full controlled bridge rectifier is supplied from 220v/50Hz AC supply. The load current is constant & is 5 AMP ; $\alpha = 30^\circ$ Calculate. 10
 - a) Average output voltage
 - b) Active & reactive power

For with & without free wheeling diode.

- b) Explain the working of 3 phase controlled (fully) bridge rectifier. Draw wave form for $\alpha < 90^\circ$. 10
- c) Explain the working of single phase half controlled rectifier with 'RL' load draw neat waveform. 10

UNIT – III

3. a) Draw & explain the block diagram of SMPs make the comparison with linear power supply in term's of advantages & disadvantages. 10
- b) Explain the working of step up converter & derive the expression for output. 10
- c) A step down chopper is operated with $V_{in} = 220V$, $T_{on} = 1m \text{ sec}$, $T_{off} = 1.5 m \text{ sec}$. Find 10
- Average o/p voltage
 - RMS O/P voltage
 - FF
 - RF.

UNIT – IV

4. a) With neat waveform explain the working of 3ϕ Inverter for 180° conduction for balanced resistive star load. 10
- b) A single phase full bridge inverter has resistive load of $R=2.5\Omega$, & DC input voltage is $V_s=50V$ determine 10
- RMS output voltage at fundamental freq.
 - Output power
 - Average & peak current of each device
 - Peak inverse blocking voltage of each device
- c) Explain single phase full bridge inverter with neat diagram for square & quasi square wave output. 10

UNIT – V

5. a) For integral alcle control If $R=10\Omega$, Input supply is $230 V/50 \text{ Hz}$. The SCR are switched on for $n = 25$ cycles & switched off for $m = 75$ cycles. Calculate. 10
- RMS output voltage
 - Power factor
 - Average current rating of SCR.
 - RMS current rating of SCR.
- b) Draw & compare the configurations of UPS. 10
- c) What are the techniques for speed control of DC & AC motors. 10

Seat Number

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Information Theory & Coding Techniques (1100)

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** from each unit.
5. All question carries equal marks.

UNIT – I

1. a) Derive Shananon Fano coding for the source having $p(x) = \{0.26, 0.25, 0.14, 0.09, 0.08, 0.07, 0.07, 0.04\}$. Find efficiency & verity the source coding theorem. 10

- b) For BSC with equally likely input signal and $P(Y/X)$ 10

where $q = 1-p$

| | |
|---|---|
| q | p |
| p | q |

find channel capacity. Also draw probability of error (p) verses capacity make comments for $p = 0, 0.5, 1$ & $0.5 < p < 1$.

- c) Define & give formulas for : 10
- | | |
|--------------|---------------|
| i) $I(X)$ | ii) $I(X, Y)$ |
| iii) $H(X)$ | iv) $H(X Y)$ |
| v) $H(X, Y)$ | |

UNIT – II

2. a) The generator polynomial of (7, 4) cyclic code is $G(P) = P^3 + P + 1$ find all code vector. 10

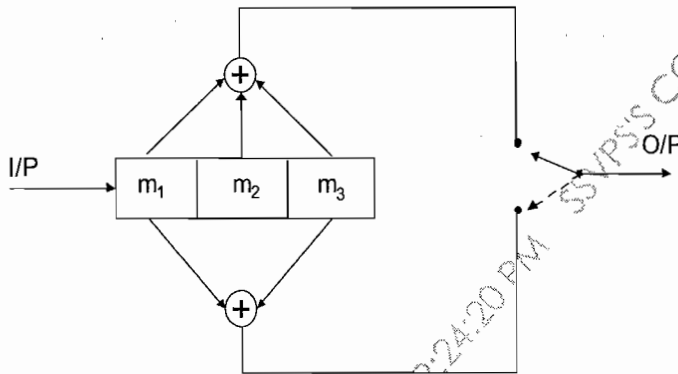
- b) What is Automatic repeat request explain in detail. 10
- c) The parity check matrix of (7,4) Hamming code is given by 10

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & : & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & : & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & : & 0 & 0 & 1 \end{bmatrix}_{3 \times 7}$$

Calculate syndrome vector for single bit error's in all possible bit position.
If the received code vector 'Y' is 1011110 find correct code vector.

UNIT – III

3. a) A rate $\frac{1}{2}$, $k = 3$ binary convolutional encoder shown in fig.
- i) Draw the tree, trellies & state diagram.
- ii) If received signal at decoder for eight bits message is
 $Y = 0001100000001001$
by decoding find out message bit sequence



- b) Explain in detail TCM. 10
- c) Draw & explain turbo code encoder & decoder. 10

UNIT – IV

4. a) What is data encryption. Explain DES. 10
- b) Explain Reed Solomon code. 10
- c) Explain JPEG standards. 10

UNIT – V

5. a) Explain multiple access techniques. 10
- b) For antenna explain following in detail : 10
-
- i) directivity. ii) directive gain.
- iii) power gain. iv) EIRP.
- c) What is need of an earth station with proper diagram explain 10
receiving & transmitting section of an earth station for satellite.

Seat Number

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चपळ - 053

Digital Communication (1030)

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** from each unit.
5. All question carries equal marks.

UNIT – I

1. a) Explain cross correlation of energy signal state & prove it's properties. 10
b) Find the Fourier transform of unit impulse signal & DC signal of unit amplitude. 10
c) State the sampling theorem. Explain aliasing effect with neat diagram. 10

UNIT – II

2. a) Explain Gaussian & Rayleigh distribution. 10
b) What is meant by random processes explain : 10
i) Stationary & non stationary random process.
ii) Ergodic process.
c) In a factory four machines A, B, C, D produce 10%, 20%, 30% & 40% of the item respectively. The percentage of defective item produced by them is 5%, 4%, 3% & 2% respectively. An item is selected at random is found to be defective. 10

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- i) What is the probability that it was produced by machine B.
- ii) What is the probability that it was produced by machine C.
- iii) What is the probability that it was produced by machine A.

UNIT – III

3. a) Draw unipolar RZ, NRZ, Polar RZ, NRZ, bipolar NRZ, & split phase manchester for the data 10110100 **10**
- b) Explain LPC speech synthesis. **10**
- c) Compare DM, ADM, DPCM, PCM for the following points V, r_b , BW, f/B by giving formulas & approximate values. **10**

UNIT – IV

4. a) Draw & explain QPSK transmitter. **10**
- b) Draw & explain reception of BPSK signal with detailed expression. **10**
- c) Draw signal space representation for BPSK, QPSK, BFSK, 8QAM, 16QAM. **10**

UNIT – V

5. a) Draw & explain DSSS. **10**
- b) Compare TDMA, FDMA, CDMA. **10**
- c) Draw output frequency verses data input for slow hop FHSS system for data pattern 011011011000 with the PN sequence as 001, 111, 011, 001, 110, 101. **10**

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 | <p>(a) It is desired to obtain 24V 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.</p> | 10 |
| | <p>(b) Design an unregulated power supply having maximum TUF and capacitive filter to provide d.c. output of 240V 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.</p> | 10 |
| | <p>(c) (i) Draw the block diagram of switching regulator and explain its operation in brief</p> | 5 |
| | <p>(ii) Design an adjustable voltage regulator using three terminal IC LM317 to provide 5V to 10V variable output voltage at load current of 1 Amp. Assume Adjustment Pin Current $I_{ADJ} = 100 \mu A$, $R_1 = 240 \Omega$.</p> | 5 |

Unit II

Marks
per

2(a) 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 $h_{FE} = 100$ and required operating point is $V_{CEQ} = 10V$, $I_{CQ} = 5mA$. Assume $V_{CC} = 22.5V$.

(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.

(c) Design a two stage RC coupled common emitter audio frequency amplifier to meet the following specifications.

$R_L = 1k\Omega$, $R_S = 1k\Omega$, $V_o \text{ peak to peak} = 3V$, $V_{CC} = 15V$, Si transistors having $h_{ie} = 1k$, $h_{fe} = 100$. (Assume coupling capacitors are large and no need to calculate)

Unit III

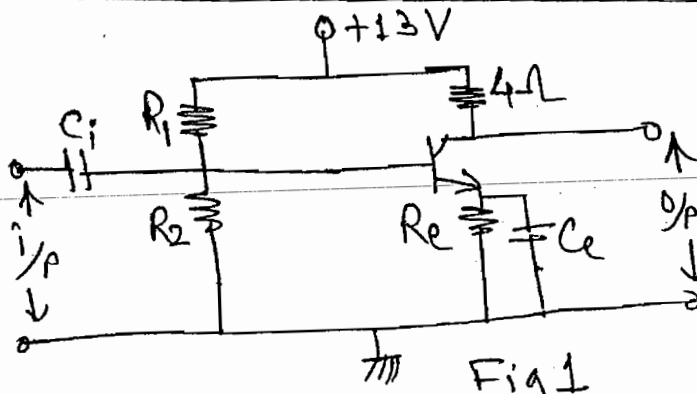
3(a) Find out the values of R_1 , R_2 and R_E of circuit shown in fig 18 so that output power is 5W across load when operating point is selected at the centre of load line. Find out the specifications of transistor and efficiency of the circuit.

10

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Q.No.
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⑥ (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

⑦ 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 (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 transistor with $h_{ie} = 1K$, $h_{fe} = 100$ and generates sine signal of 5MHz for $R_L = 1K$. Draw the Circuit.

5

Q.No.
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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 ~~$I_{DSS} = 7 \text{ mA}$~~ , $V_{DSQ} = 8 \text{ V}$, $V_{DD} = 20 \text{ V}$,
 $I_{DQ} = 3.5 \text{ mA}$, $I_{DSS} = 7 \text{ mA}$, $V_p = -6 \text{ V}$, $g_{m0} = \text{~~5 mS~~ 5 mS}$,
 $r_d = 50 \text{ k}\Omega$.

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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.

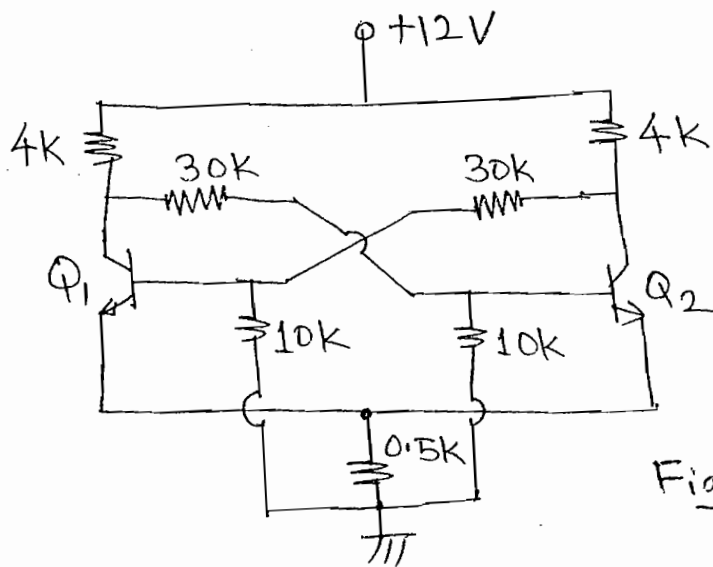


Fig 2

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UNIT V

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

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(ii) Design an inverting amplifier using op-amp 741 with single power supply to provide $A_{vf} = -10$, ~~10~~ and $f_L = 30 \text{ Hz}$.

5

(b) Design 2nd order Butterworth's Low Pass Filter having cut off frequency $f_c = 1 \text{ kHz}$. Suggest suitable modification in the circuit to make its gain as one

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(c) Sketch the output waveform for the circuit shown in fig 3, if 5 V rms , ~~5V rms~~ 1 kHz frequency sine signal is applied at its input. Assume ideal op-amp

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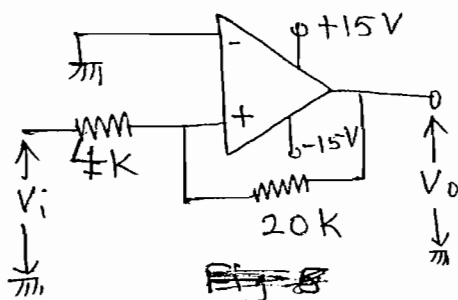


Fig 3

(ii) write a short note on - "Peak to Peak Detector using comparator."

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