6E 6051

Roll No. ____________________

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6E 6051

B.Tech. VI Semester (Main & Back) Examination, April - 2019
Electronics & Communication Engineering
6EC1A Microwave Engineering-II

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit.** All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) State the various design consideration for fabrication of lumped inductors and capacitors in MIC. What are the additional criteria for fabrication of sandwich-type capacitors? **(10)**

   b) Determine the capacitance of an interdigitated capacitor fabricated on a substrate $E_r = 13$. other parameters are n=10, substrate height = 0.1 inch, finger length=0.001 inch , finger base width=0.02 inch. **(06)**

(OR)

1. a) Explain the process of L-section matching networks and stub matching of microstrip lines. **(08)**

   b) What are the required length and impedance of a $\lambda_g/4$ transformer that will match a 100Ω load to a 50Ω, air filled line at 10GHz. Consider both rectangular waveguide (2.286 cm×1.016cm) and coaxial line cases. **(08)**

Unit - II

2. a) Describe the principle of working and draw the equivalent circuit of P-I-N (PIN) diode. **(06)**

   b) How PIN diode can be used as modulator? Explain the use of PIN diode in switches and phase shifter. **(06)**

   c) The drift velocity of electrons is 2×10^7 cm/sec through the active region of length 10×10^{-4}cm. Calculate the natural frequency of the diode and the critical voltage. **(04)**

(OR)

2. a) Explain the IMPATT diode with following **(12)**

   i) DC operating principle

   ii) Mechanism of oscillation

   iii) Mounting and equivalent circuit

   b) A $p^+ - \pi - n^+$ silicon diode with a break down voltage of 1000V. The cutoff frequency is 30GHz. The breakdown electric field for Si is 3.0×10^5 V/cm. If Junction Capacitance is 0.3pf then calculate the total series Resistance. **(04)**

Unit - III

3. a) Draw a schematic of GaAs MESFET and explain its working with various biasing conditions. **(12)**

   b) A GaAs MESFET has channel height of 0.12μm electron concentration $N_d = 8 \times 10^{17} cm^{-3}$ and the relative dielectric constant 13.2. Calculate the Rinchoff voltage. **(04)**

(OR)

3. a) Write the various steps for designing a single stage microwave MESFET amplifier. **(08)**

   b) A GaAs MESFET amplifier is to be designed at 5GHz with 400MHz bandwidth for maximum power gain. The measured parameters at 5 GHz with a 50Ω reference are **(08)**

   $S_{11} = 0.52\angle -145°, S_{12} = 0.03\angle 20°$

   $S_{21} = 2.56\angle 17°, S_{22} = 0.48\angle -20°$

   $\Gamma S_{in} = 0.75\angle 170°, \Gamma L_{out} = 0.72\angle 105°$

   Determine $G_{A\max}$.

Unit - IV

4. a) What is velocity and current modulation in reflex Klystron? Describe the reflex Klystron with aid of schematic diagram. **(10)**

   b) A reflex Klystron is to be operated at frequency of 10GHz with dc beam voltage 300V, repeller space 0.1cm for $1\frac{3}{4}$ mode. Calculate $P_{RF\max}$ and corresponding repeller voltage for a beam current of 20 mA. **(06)**

(OR)

4. a) Describe the construction of a multicavity magnetron and obtain an expression for full cut off voltage for π-mode of operation. Explain how mode Jumping can be avoided. **(12)**

b) A frequency agile magnetron has duty cycle of 1ms and pulse duration of 0.20, 0.40 and 0.80μs. If the pulse rate on the target be N = 20 per scan determine : **(04)**

i) The agile excursion

ii) The signal frequency

iii) The agile rate.

Unit - V

5. Write short notes on **(any two)** **(2×8=16)**

i) Slow wave structures used in TWT.

ii) Two cavity Klystron amplifier.

iii) Backward wave oscillator.

iv) Coupled cavity TWT.

(OR)

5. A multicavity TWT is operating at cathode voltage 30kV and cathode current 7.5A. The output power is 60 kW and the collector voltage is −12kV. What is electronic and overall efficiency? **(16)**

6E 3085

Roll No. ______________________ [Total No. of Pages : 3

6E 3085

B.Tech. VI-Semester (Back) Examination, April-2019
Electronics & Communication Engg.
6EC1(O) Microwave Engg.-II

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly).*

Unit - I

1. a) Discuss the Network analyser set up for the measurement of scattering parameters. **(8)**

   b) In a SWR measurement at 10 GHz the distance between the successive minima is 0.1cm. Inside dimension of waveguides are 4cm and 2cm respectively. TE_{10} mode is propagating through the waveguide. Calculate the VSWR. **(8)**

(OR)

1. a) Explain the methods of impedance measurement with suitable diagrams. **(10)**

   b) An unknown load terminates a 50Ω microwave line. The VSWR measured is 2.4 and the first minima is located at a distance 0.313 λ from the load. Find the unknown load and reflection coefficient. **(6)**

Unit - II

2. a) Describe the strip lines structures, higher order modes, losses and excitation of strip lines. **(8)**

   b) A microstrip line is constructed of a perfect conductor and a lossless dielectric board. The relative dielectric constant of the fiber glass-epoxy board is 5.23, and the line characteristic impedance is 50Ω, calculate this line inductance and this line capacitance. **(8)**

(OR)

2. a) What are the different types of losses that occur in microstrip lines. Discuss them in detail with necessary relation. **(10)**

b) A certain microstrip has the following parameters:-

$\varepsilon_r = 5.23$ $t = 2.8$ mils

$h = 7$ mils $w = 10$ mils

Calculate the characteristic impedance (Z_0) of the line. **(6)**

Unit - III

3. a) What are signal flow graphs? How are they advantageous in microwave network analysis? **(8)**

b) The impedance matrix of a certain microwave circuit is $[Z] = \begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$ determine the corresponding scattering matrix. **(8)**

(OR)

3. a) Discuss ABCD matrix analysis of two port networks. **(8)**

b) How can we say Directional coupler is a reciprocal multipart junction. Explain its construction and working. **(8)**

Unit - IV

4. a) Explain how Gunn diodes are able to exhibit dynamic negative resistance. What are various materials used to make Gunn diodes? Why Si is not suitable for Gunn diodes? **(8)**

b) A certain silicon microwave transistor has the following parameters:

Reactance $X_c = 1\,\Omega$, transit -time cut off frequency f_r=4GHz, maximum electric field E_m=1.6×10^5 v/cm, saturation drift velocity V_s=4×10^5 cm/s. Determine the maximum allowable power that the transistor can carry. **(8)**

(OR)

4. a) Discuss TRAPTT Diodes on the basis of following points. **(12)**

i) Physical structure.

ii) Principle of operation.

iii) Power output.

iv) Efficiency.

b) What is varactor diode? Draw the lay out of a varactor diode. **(4)**

Unit - V

5. a) Discuss different types of MMIC fabrication techniques. **(10)**

b) Categorize the materials available for MMIC and give their characteristics. **(6)**

(OR)

5. a) Discuss the capacitor film development. (4)

   b) Describe the inductor film formation. (4)

   c) A circular spiral inverter has the following parameters : number of turns n=5, separation S=100 mils, film width W=50 mils. Compute the inductance. (8)

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6E3086

6E 3086

B.Tech. VI - Semester (Back) Examination, April.2019
Electrical and Electronics Engineering
6EX2(O) Microprocessor and Micro controller
Common with EX,EC

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

Attempt any ***Five questions****, selecting* ***One question*** *from* ***each unit.*** *All Questions carry* ***equal*** *marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Explain the following types of memory
   - i) Auxiliary memory
   - ii) Cache memory. **(08)**

   b) Explain the different types of ROM in details. **(08)**

(OR)

1. a) How many 32K × 1 RAM chips are needed to provide a memory capacity of 256K bytes? **(08)**

   b) Explain the central processing unit with the help of diagram. Also explain its need and applications. **(08)**

Unit - II

2. a) Draw Pin diagram 8085 microprocessor and explain its various pins. **(08)**

   b) Explain the following instruction of 8085 microprocessor with example:
   - i) POP.
   - ii) LHLD.
   - iii) MVI.
   - iv) RRC. **(08)**

(OR)

2. a) What are different flags available in 8085 microprocessor? Explain each in brief. **(08)**

   b) Describe the memory organization? Also explain various types of Interrupts. **(08)**

Unit - III

3. a) Explain the classification of the instruction set of 8085 microprocessor with suitable example. **(08)**

   b) Explain the use of rotate instruction with the help of suitable examples. **(08)**

(OR)

3. a) Write an assembly language program for subtraction of two unsigned numbers. Draw the flow chart also. **(08)**

   b) Write an assembly language program to find the larger of 92H and 85H numbers. **(08)**

Unit - IV

4. a) Draw the pin diagram of 8279 and explain its various commands. **(08)**

   b) Explain the block diagram of 8259 chip. Explain the specific purpose of different blocks in the 8259 block diagram. **(08)**

(OR)

4. a) Draw and explain the block diagram of 8155. **(08)**

   b) Draw the pin diagram of 8255 and explain its various modes. **(08)**

Unit - V

5. a) Draw the internal architecture of 8051 and briefly explain. **(08)**

   b) Explain the register set of 8051 microcontroller. **(08)**

(OR)

5. a) Draw programming model of 8051 microcontroller and briefly describe. **(08)**

   b) Briefly describe the interrupt system of 8051 microcontroller. **(08)**

6E6052

Roll No. ____________________

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6E6052

B.Tech. VI - Semester (Main & Back) Examination, April-2019
Electronics & Communication Engineering
6EC2A Microprocessors

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.*

Unit - I

1. Explain and Draw the Block Diagram as well as PIN Diagram of 8085 microprocessor. **(16)**

(OR)

1. a) Explain the need to demultiplex the bus AD_0-AD_7 in 8085 microprocessor. **(08)**

b) Explain briefly different type of buses used in microprocessor. **(08)**

Unit - II

2. a) Explain the following instructions of 8085 microprocessor- **(4×2=8)**

i) CMP

ii) XCHG

iii) LDAX

iv) STAXB

b) Explain in detail about subroutine and their usefulness in 8085 microprocessor. **(08)**

(OR)

2. a) Define opcode and operand. Specify the opcode and operand in the instruction (MOV H,L). **(08)**

b) Write an assembly language program to find 1's and 2's complement of 16 Bit number. **(08)**

[Contd....

Unit - III

3. a) Explain the term machine cycle, T-state and Instruction cycle. **(08)**

   b) Explain timing Diagram of 2-Byte instruction (MVI A, 32H). **(08)**

(OR)

3. Explain the 16 Bit data operation and arithmetic instruction. **(16)**

Unit - IV

4. a) Distinguish Between software and hardware interrupts. Draw the diagram of interrupt structure of 8085 MPU. **(10)**

   b) Explain the instruction RIM and SIM. Illustrate how to use them for 8085 MPU. **(06)**

(OR)

4. a) What do you mean by vectored and non-vectored interrupt. **(04)**

   b) Differentiate between maskable and non maskable interrupts. Write an instruction to mask RST 7.5 and RST 6.5 interrupt simultaneously. **(12)**

Unit - V

5. Explain programmable peripheral devices, along with the PIN and block diagram. **(16)**

(OR)

5. Write short note on the following: **(2×8=16)**

   a) DMA controller

   b) Interval timer.

6E6053

Roll No. ____________________ [Total No. of Pages : 2

6E6053

B.Tech. VI Semester (Main&Back) Examination, April-2019
Electronics & Communication Engg.
6EC3A Industrial Electronics
(Common with AI, EC, EI)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

Attempt any **five questions**, *selecting* **one question** *from* **each unit.** *All questions carry* **equal** *marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly).*

Unit - I

1. a) Explain the need of commutation in thyristor circuits. What are the different methods of commutation schemes? Explain in brief with neat schematic and waveforms. **(10)**

   b) Describe the triggering circuit for a triac using diac. **(06)**

(OR)

1. a) It is required to operate 250A SCR in parallel with 350-A SCR with their respective on state voltage drop of 1.6V and 1.2V. Calculate the value of resistance to be inserted in series with each SCR so that they share the total load of 600A in proportion to their current ratings. **(08)**

   b) Explain the methods adopted for the protection of SCRs with over currents. **(08)**

Unit - II

2. a) A single phase full converter feeds power to RLE load with $R = 6\Omega$, L=6mh and E= 60V. The ac source voltage is 230V, 50Hz. For continuous conduction find the average value of load current for a firing angle delay of 50°. **(08)**

   b) Describe the operation of a single phase two pulse midpoint converter with relevant wave forms. **(08)**

(OR)

2. a) Discuss the principle of working of a three phase bridge inverter with circuit diagrams and wave forms. **(10)**

   b) Draw phase and line voltage waveforms in case of each thyristor conducts for 180° and the resistive load is star connected. **(06)**

Unit - III

3. a) What is a dc chopper? Describe the various types of choppers with appropriate diagrams and waveforms. **(12)**

   b) A step-up chopper has input voltage of 220V and o/p voltage of 660V. If the non conducting time of thyristor chopper is 100μs, compute the pulse width of output voltage. **(04)**

(OR)

3. a) What is an UPS? Give up its industrial applications. Describe rotating-type, short break static and no break static UPS. **(12)**

   b) Briefly explain the high frequency electronic ballast. **(04)**

Unit - IV

4. a) The chopper used for on-off control of a dc separately excited motor has supply voltage of 230V dc; an on time of 10msec and off time of 15msec. Calculate the average load current when the motor speed is 1500 rpm and has a voltage constant $K_V = 0.5$ v/rad per sec. The armature resistance is $3\,\Omega$. **(08)**

   b) Briefly discuss the methods of speed control of DC motors using choppers. **(08)**

(OR)

4. Describe the speed control methods of three phase induction motors. **(16)**

Unit - V

5. Write the short note on **any two**: **(2×8=16)**

   a) Permanent magnet stepper motors.

   b) Induction and dielectric heating control of stepper motors.

   c) Hybrid stepper motors.

6E 6054

Roll No. ______________________ [Total No. of Pages : 3

6E 6054

B.Tech. VI - Semester (Main&Back) Examination, April.2019
Electronics & Communication Engg.
6EC4A Digital Communication

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

Attempt any ***Five questions****, selecting* ***One question*** *from* ***each unit.*** *All Questions carry* ***equal*** *marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly Units of quantities used/calculated must be stated clearly).*

Unit - I

1. a) By drawing the block and schematic diagrams of the transmitter and receiver and with the help of relevant waveforms, explain the working of a Delta modulation system. **(08)**

   b) A signal $m(t) = \frac{2}{\pi}\sin(10^3 \pi t)$ is sampled and delta modulation. The granular noise can not exceed 0.2V and there will be no slope overload. Calculate the step size and sampling frequency. **(08)**

(OR)

1. a) Explain the multiplexing of different PCM and DPCM signals and calculate the transmission speed of T-1 carrier system. **(05)**

   b) With the help of block schematic diagrams of transmitter and receiver explain the working of binary PCM system. **(06)**

   c) AP CM system is to carry a 20 KHz music channel. It is to have a signal to noise ratio of 80dB and the peak maximum signal is 15dB over its rms value. What sampling rate should be used? **(05)**

Unit - II

2. a) Write down the expression for the transfer function and the impulse response of a matched filter for the signal P(t) which is of T second duration. **(08)**

   b) Consider the binary sequence 10110001 draw the waveform of following formats

   i) Bipolar Rz ii) Bipolar NRz iii) AMI iv) Split phase **(08)**

(OR)

2. a) A communication channel of bandwidth 50KHz is required to transmit binary data at a rate of 0.1 Mb/s using raised-cosine pulses. Determine the roll off factor. **(06)**

b) What is ISI? How raised cosine spectrum and ideal Nyquist channel are useful to avoid ISI explain it? **(10)**

Unit - III

3. a) Given the input binary sequence 100010110, sketch the waveforms of the in phase and quardrature components of an MSK signal sketch the MSK signal also. **(08)**

b) What is QPSK? Draw the signal space and signal constellation and calculate the probability of error. **(08)**

(OR)

3. a) A microwave link is used for transmitting binary data at the rate of 1Mbps, Assuming the PSD of noise at the input of the receiver to be $10^{-10} W/Hz$. Find the transmission bandwidth and the average carrier power required to be maintained if the probability of error P(e) is not to exceed 10^{-4}, when

   a) Coherent BPSK and

   b) Coherent BFSK are used **(08)**

b) With the help of a block schematic diagrams explain the working of coherent FSK receiver and transmitter **(08)**

Unit - IV

4. a) A source produces three symbols A, B and C with the following marginal and conditional probabilities

i	P(i)
A	1/4
B	1/4
C	1/2

P (j/i)		j		
		A	B	C
i	A	1/8	1/4	5/8
	B	1/2	1/8	3/8
	C	3/8	5/8	0

   i) Assuming there is no intersymbol influences calculate the entropy of the source.

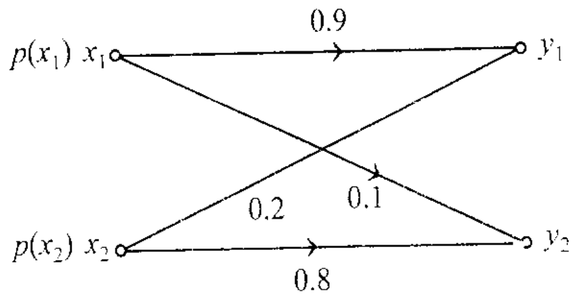
   ii) If index i refers to 'X' and j refers to 'Y' determine the conditional entropy H(Y/X)

(10)

b) State Shanon's source-coding theorem and explain it. **(06)**

(OR)

4. a) Consider a binary channel shown in figure.



i) Find $P(y_1)$ and $P(y_2)$ when $P(x_1)=P(x_2)=0.5$

ii) Find the $p(x_1, y_2)$ and $P(x_2, y_1)$ when $P(x_1)=P(x_2)=0.5$

(08)

b) Explain Information content of a symbol and entropy. **(08)**

Unit - V

5. a) A DMS X has five equally likely symbols construct the Shannon fano and Huffman code for X. Calculate the efficiency and compare. **(12)**

b) For a systematic linear block code, the three parity check bits C_4, C_5 and C_6 are formed as

$C_4 = d_1 \oplus d_3$

$C_5 = d_1 \oplus d_2 \oplus d_3$

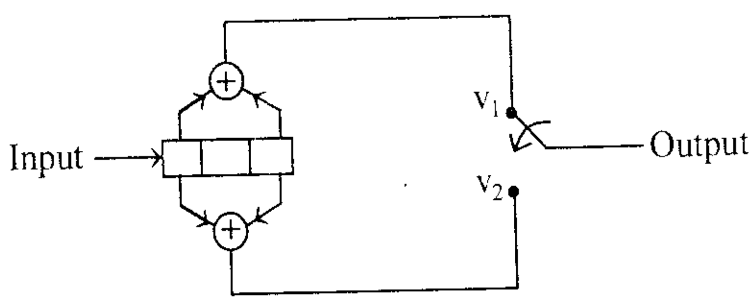
$C_6 = d_1 \oplus d_2$

Write the generator matrix **(04)**

(OR)

5. a) A channel encoder uses a (7, 4) linear cyclic code in the systematic form of the generator polynomial being $(x^3 + x + 1)$. Find the corrects code word if the received word is 1011011 **(08)**

b) Find the impulse response of Convolutional encoder shown in figure. **(08)**



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6E 6055

Roll No. ____________________

6E 6055

B.Tech. VI - Semester (Main&Back) Examination, April - 2019
Electronics & Communication Engg.
6EC5A Control Systems

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. *Graph paper.* 2. *Logarithmic paper.*

Unit - I

1. a) Define the following terms : (8)
   - i) System
   - ii) Control System
   - iii) Feed back
   - iv) Servo mechanism

   b) Reduce the block diagram (shown in Figure(i)) to obtain $\frac{C(s)}{R(s)}$. (8)

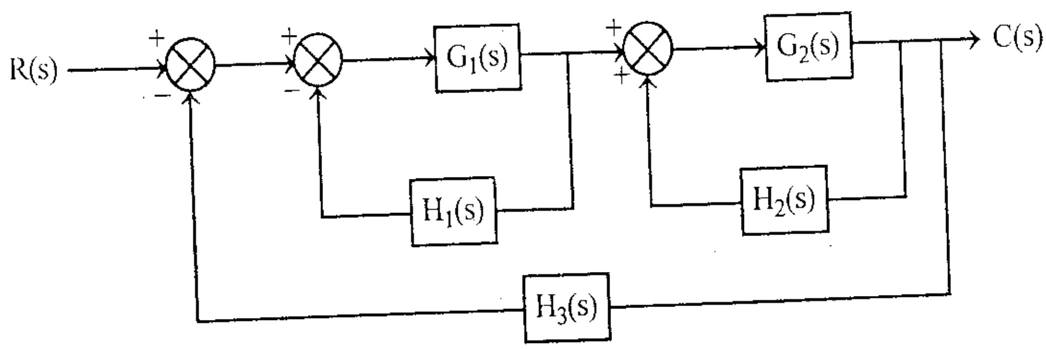


Figure - (i)

(OR)

1. a) Find gain of the given system (shown in Figure (ii)) $\frac{C}{R}$ by using, Masson's gain formula. **(8)**

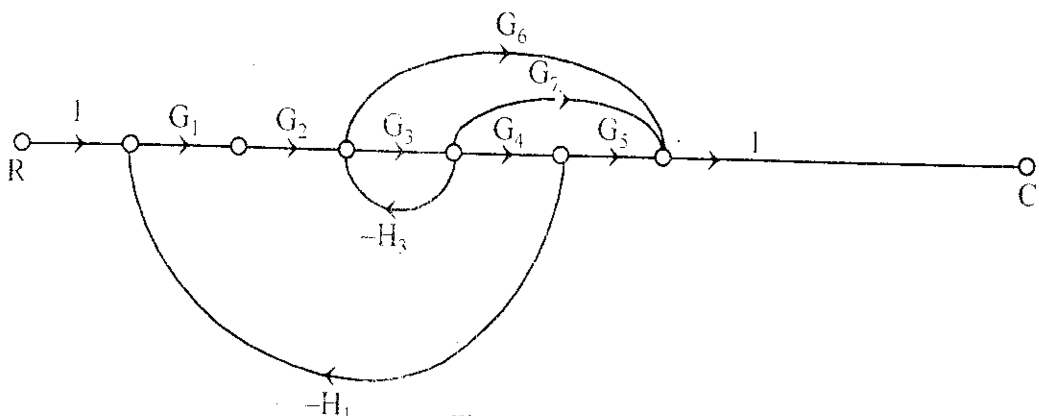
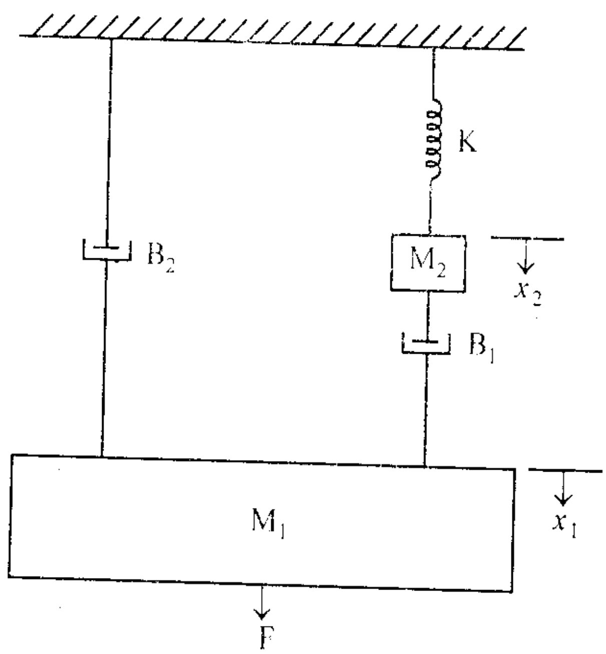


Figure - (ii)

b) For the system shown in Figure (iii), find the following: **(8)**

i) Force voltage Analogy

ii) Force current Analogy



(Figure - iii)

Unit - II

2. a) With the help of Routh-Hurwitz stability criterion comments upon the stability of the system having the following characteristic equation

$$S^6 + S^5 + 8S^4 + 6S^3 + 20S^2 + 8S + 10 = 0$$ **(8)**

b) Derive the values of steady state error for type 0, 1 and 2 system due to following: **(8)**

i) Step input

ii) Ramp input

iii) Parabolic input

(OR)

2. a) Determine the unit step response of the second order system for the underdamped and critically damped cases. **(10)**

b) What do you understand by the term stability? Also explain the importance of stability. **(6)**

Unit - III

3. Obtain G(s)H(s) from the given equation and draw complete root locus for this control system $s(s+4)(s^2+4s+20)+k=0$. **(16)**

(OR)

3. Is the system with the following open-loop transfer function and with $K=2$ stable?

$$G(s)H(s)=\frac{K}{s(s+1)(2s+1)}$$

Find the critical value of the gain K for stability by use of the Nyquist stability criterion and also draw the complete Nyquist plot for this system. **(16)**

Unit - IV

4. Sketch the Bode plot and find the phase and gain margin for the system $G(s)H(s)=\dfrac{10(3+s)}{s(s+2)(s^2+s+2)}$ Also comment upon the stability of the system. **(16)**

(OR)

4. Write the short notes on the following:

i) M & N Loci

ii) Nichols chart **(16)**

Unit - V

5. a) Determine transfer function for the system whose state model is given by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \qquad y = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u$$ **(10)**

b) Explain the concepts of controllability and observability. **(6)**

(OR)

5. a) A feedback system is characterized by the closed loop transfer function:

$G(s) = \dfrac{5}{s^3 + 6s^2 + 11s + 6}$ choosing suitable state variable, construct a state model for the system. **(8)**

b) Explain the PID controller with block diagram in brief. **(8)**

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6E 3093

6E 3093

B.Tech. VI - Semester (Back) Examination, April-2019
Electronics & Communication Engineering
6EC6.3(O) Optimization Techniques

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

Attempt any **Five questions**, *selecting* **One question** *from* **each unit.** *All Questions carry* **equal** *marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

UNIT-I

1. a) What is optimization? Explain ten engineering applications of optimization. **(8)**

   b) A manufacturer of a line of patient medicines is preparing a production plan on medicines A and B. There are sufficient ingredients available to make 20,000 bottles of A and 40,000 bottles of B but there are only 45,000 bottles into which either of the medicines can be put. Furthermore, it takes 3 hours to prepare enough material to fill 1,000 bottles of A, it takes 1 hour to prepare enough material to fill 1,000 bottles of B and there are 66 hours available for this operation. The profit is Rs. 8/- per bottle for A and Rs. 7/- of B. Formulate this problem as a linear programming problem. **(8)**

(OR)

1. Write a short note on the classification of optimization problems based on various parameters. **(16)**

UNIT-II

2. a) Using Simplex method, show that the following linear programming problem has an unbounded solution : **(8)**

   Minimize $z = -2x_1 - 3x_2$

   Subject to $x_1 - x_2 \leq 1$

   $3x_1 - 2x_2 \leq 6$

   $x_1, x_2 \geq 0$.

b) Write the dual of the following linear programming problem : **(8)**

Maximize $z = x_1 + 4x_2 + 3x_3$

Subject to $2x_1 + 3x_2 - 5x_3 \le 2,$

$3x_1 - x_2 + 6x_3 \ge 1,$

$x_1 + x_2 + x_3 = 4$

and $x_1, x_2 \ge 0, x_3$ is unrestricted in sign.

(OR)

2. Using Big-M method, solve the following linear programming problem: **(16)**

$Max.\ z = -2x_1 - x_2$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \ge 6$

$x_1 + 2x_2 \le 4$

and $x_1, x_2 \ge 0$.

UNIT-III

3. Four different jobs can be done on four different machines. The setup and take down time costs are assumed to be prohibitively high for change over's. The matrix below gives the cost in rupees of producing job i on machine j : **(16)**

Jobs	Machines			
	M_1	M_2	M_3	M_4
J_1	5	7	11	6
J_2	8	5	9	6
J_3	4	7	10	7
J_4	10	4	8	3

How should the jobs be assigned to various machines, so that the total cost is minimized?

(OR)

3. Using Vogel's Approximation method, find basic feasible solution for the following Transportation problem: **(16)**

	Destination				Availability
	X	Y	Z	W	
A	1	2	1	4	30
B	3	3	2	1	50
C	4	2	5	9	20
Requirement	20	40	30	10	100

Hence, also find the optimum solution.

UNIT-IV

4. Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ with the starting point $(0,0)$, using Univariate method for two cycles. **(16)**

(OR)

4. Minimize $f(x, y) = x^2 + 2y^2$

Subject to $2x + 5y - 10 \leq 0$

by using exterior penalty method and find solution (in table) for r = 1, 100 and $r \to \infty$. **(16)**

UNIT-V

5. Solve the following problem: **(16)**

Minimize $\quad Z = \sum_{i=1}^{n} y_i^2$

Subject to $\quad \prod_{i=1}^{n} y_i = b$

and $\quad y_i \geq 0; i = 1, 2, \ldots, n.$

(OR)

5. Solve the following linear programming problem by Dynamic Programming Approach: **(16)**

Max. $Z = 2x_1 + 5x_2$

Subject to $2x_1 + x_2 \leq 43$

$2x_2 \leq 46$

and $x_1, x_2 \geq 0$

6E 6058

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6E 6058

B.Tech. VI Semester (Main&Back) Examination,April.2019
Electronics & Communication Engg.
6EC6.3A Optical Fiber Communication

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit.** All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Explain what you mean by a step index and graded index optical fiber. Giving an expression for the possible refractive index profile. Why a graded index fiber with a parabolic index profile is preferred? **(2+2+4)**

   b) A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating at a wavelength of 0.85 μm. If the core refractive index is 1.48, estimate:

   i) The normalized frequency for fiber.

   ii) The number of guided modes. **(4+4)**

(OR)

1. a) What is Dispersion? Explain and compare the dispersion shifted cable and dispersion flattened cable with neat diagram. **(2+4+2)**

   b) What are the materials require for manufacturing the optical fiber? Describe the modified chemical vapor phase deposition (MCVD) method for preparation of optical fiber. **(3+5)**

Unit - II

2. a) The radiative and non radiative recombination lifetimes of the minority carriers in the active region of a double hetro junctions LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 0.87 μm at a drive current of 40mA. **(4+4)**

   b) Explain direct bandgap and indirect bandgap semiconductor materials. Which type of material is use for optical fiber? Also explain their applications in optoelectronics. **(4+2+2)**

(OR)

2. a) What is the importance of LASER in optical communication? Drive the rate equation for laser diode. (4+4)

   b) Describe the common LED structure for optical fiber communication; also give their merits and demerits. (4+2+2)

Unit - III

3. a) Explain the following terms of photo diode

      i) Quantum efficiency

      ii) Responsivity (4+4)

   b) A 60/120 μm graded-index fiber with a numerical aperture of 0.25 and a profile parameter of 1.9 is jointed with a 50/120 μm graded-index fiber with a numerical aperture of 0.20 and a profile parameter of 2.1. If the fiber axes are perfectly aligned and there is no air gap, calculate the insertion loss at the joint in the forward and backward directions. (4+4)

(OR)

3. a) A four port multimode fiber FBT coupler has 60 μW optical power launched into port 1. The measured output power at port 2, 3 and 4 are 0.004, 26.0 and 27.5 μW respectively. Determine the excess loss, the insertion losses between the input and the output ports, the crosstalk and the split ratio for the device. (2+2+2+2)

   b) What is splicing in fiber? Explain different types of techniques use for splicing the optical fiber with neat diagram. (2+6)

Unit - IV

4. a) A trigonometric measurement is performed in order to determine the numerical aperture of a step index fiber. The screen is positioned 10 cm from the fiber end face. When illuminated from a wide angled visible source the measured output pattern size is 6.2 cm. calculate numerical aperture of fiber. (08)

   b) Describe the cut back method for attenuation measurement in the laboratory. Explain its advantage and disadvantages. (08)

(OR)

4. a) What is the need of Optical Time Domain Reflectometry (OTDR) in optical fiber communication? Explain the process of fault location identification with neat graph and diagram. (3+5)

   b) Explain the working of laser based system for measurement of distance with neat diagram. (08)

Unit - V

5. a) Describe the Wavelength division multiplexing (WDM) and compare with Dense wavelength division multiplexing (DWDM). **(4+4)**

   b) What is the object of optical amplifiers? Explain Erbium doped fiber amplifier (EDFA) with neat diagram. **(2+6)**

(OR)

5. a) Explain the Mach-Zehnder interferometric sensor for fiber optics. **(08)**

   b) Describe the applications of fiber optics in industries, military and computer drives. **(2+3+3)**
