

Total Printed Pages : 7

6E3093

B. Tech. (Sem. VI) (Back) Examination, April-May 2018
Electronics & Communication Engg.
6EC6.3(O) Optimization Techniques

Maximum Marks : 80
Min. Passing Marks : 26

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. NIL 2. NIL

UNIT - I

- 1 (a) What is optimization technique ? Write down a short note on engineering application of optimization.
- 8
- (b) A garment manufacturer has production line making two styles of shirts. Style I requires 200 grams of cotton thread, 300 grams of dacron thread and 300 grams of linen thread. Style II requires 200 grams of cotton thread, 200 grams of dacron thread and 100 grams of linen thread. The manufacturer makes a net profit of Rs. 19.50 on style 1, Rs. 15.90 on style II. He has in hand an inventory of 24 kg of cotton thread, 26 kg of dacron thread and 22 kg of linen thread. Formulate the LPP to maximize profit.

8

OR

- 1 Write down a short note on "classification of optimization problem" based on following :
- (a) Classification based on the nature of the design variables.
 - (b) Classification based on the nature of equation involved.
 - (c) Classification based on the permissible values of the design variables.
 - (d) Classification based on the number of objective functions.

4×4=16

UNIT - II

- 2 Solve the following L.P. problem by simplex method

$$\text{Minimize } z = 30x_1 + 20x_2$$

$$\text{s.t. } -x_1 - x_2 \geq -8$$

$$-6x_1 - 4x_2 \leq -12$$

$$5x_1 + 8x_2 = 20$$

$$\text{and } x_1, x_2 \geq 0$$

16

OR

- 2 Solve the following L.P.P. revised simplex method

16

$$\text{Max } z = x_1 + 2x_2$$

$$\text{s.t. } x_1 + x_2 \leq 3$$

$$x_1 + 2x_2 \leq 5$$

$$3x_1 + x_2 \leq 6$$

$$\text{and } x_1, x_2 \geq 0$$

16

UNIT - III

- 3 (a) Solve the following assignment problem of minimising total time for doing all the jobs :

Operator	Job				
	1	2	3	4	5
1	6	2	5	2	6
2	2	5	8	7	7
3	7	8	6	9	8
4	6	2	3	4	5
5	9	3	8	9	7
6	4	7	4	6	8

8

- (b) Find the optimum solution to the following transportation problem in which the cells contain the transportation cost in rupees.

	W_1	W_2	W_3	W_4	W_5	Available
F_1	7	6	4	5	9	40
F_2	8	5	6	7	8	30
F_3	6	8	9	6	5	20
F_4	5	7	7	8	6	10
Required	30	30	15	20	5	

8

OR

- 3 (a) Solve the following transportation problem where cell entries are unit cost.

	D ₁	D ₂	D ₃	D ₄	D ₅	Available
O ₁	68	35	4	74	15	18
O ₂	57	88	91	3	8	17
O ₃	91	60	75	45	60	19
O ₄	52	53	24	7	82	13
O ₅	51	18	82	13	7	15
Required	16	18	20	14	14	

8

- (b) Four different jobs can be done on four different machines. The matrix below gives the cost in rupees of producing job i on machine j. How should the jobs be assigned to the various machines so that total cost is minimized.

Jobs	Machines			
	1	2	3	4
I	12	30	21	15
II	18	33	9	31
III	44	25	24	21
IV	23	30	28	14

8

UNIT - IV

- 4 (a) Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ from the starting point $X_0 = (0, 0)$ using Powell's method.

8

- (b) Minimize $f(x_1, x_2) = 2x_1^2 + x_2^2$ by steepest descent method. The starting point is (1,2) and solve upto two iterations.

8

OR

- 4 (a) Minimize $f(x_1, x_2) = x_1^2 + x_2^2 - 2x_1 - 3x_2 + 3$ subject to
 $g(x_1, x_2) = x_1 + 2x_2 - 4 \leq 0$ with the starting point $X_0 = (0, 0)$
 take $e_1 = 0.001$, $e_2 = 0.001$ and $e_3 = 0.01$

8

- (b) Minimize $f(x) = \frac{1}{3}(x_1 + 1)^3 + x_2$

Subject to $g_1(x) = -x_1 + 1$

$$g_2(x) = -x_2 \leq 0$$

using exterior penalty function method.

8

UNIT - V

- 5 (a) Solve the problem by dynamic programming technique and find

$$\text{Minimize } Z = \mu_1 \mu_2 \mu_3$$

$$\text{s.t. } \mu_1 + \mu_2 + \mu_3 = 5$$

$$\text{and } \mu_1, \mu_2, \mu_3, \geq 0$$

8

- (b) Use dynamic programming to solve LPP

$$\text{Max } Z = x_1 + 9x_2$$

$$\text{s.t. } 2x_1 + x_2 \leq 25$$

$$x_2 \leq 11$$

$$\text{and } x_1, x_2 \geq 0$$

8

OR

- 5 (a) Solve the following LPP by dynamic programming

$$\text{Max } z = 8x_1 + 7x_2$$

$$\text{s.t. } 2x_1 + x_2 \leq 8$$

$$5x_1 + 2x_2 \leq 15$$

$$\text{and } x_1, x_2 \geq 0$$

8

(b) Use dynamic programming approach to solve

$$\text{Minimize } Z = y_1^2 + y_2^2 + \dots + y_n^2$$

$$\text{s.t. } y_1, y_2, y_3, \dots, y_n = C; (c \neq 0)$$

$$\text{and } y_j \geq 0, j = 1, 2, \dots, n$$

6E3085

Roll No. : _____

6E3085

B. Tech. (Sem. VI) (Back) Examination, April-May 2018
 Electronics & Communication Engg.
 6EC1(O) Microwave Engg. - II

Time : 3 Hours

Maximum Marks : 80
 Min. Passing Marks : 26

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. NIL 2. NIL

UNIT - I

- 1 (a) Explain the impedance and VSWR measurement by using the slotted line method. 8
- (b) Explain the method for measuring of scattering parameters with suitable diagram. 8

OR

- 1 (a) Calculate the VSWR of Transmission system separated at 10 GHz (TE_{10} mode) having $a = 4$ cm, and $b = 2.5$ cm. The distance measured between twice minipower point is 1.0 mm on a slotted line. 6
- (b) How will you detect microwave signal ? Explain one method in detail with neat diagram also explain method for power measurement. 10

UNIT - II

- 2 (a) Describe the various types of losses present in microstrip lines. 10
- (b) A certain microstrip line has following parameters
 $\epsilon_r = 5.23$, $h = 7$ mils, $t = 2.8$ mils, $W = 10$ mils
 Calculate the characteristics impedance Z_0 of the line. 6

OR

- 2 (a) Draw the field line patterns for
 (i) Shielded stripline
 (ii) Parallel strip line 3+3=6
- (b) A shielded strip line has the following parameters dielectric constant of the insulator
 $\epsilon_r = 2.56$,
 Strip width $W = 25$ miles
 Strip Thickness $t = 14$ miles
 Shield depth $d = 70$ miles
 Calculate
 (a) The K factor
 (b) The fringe capacitance
 (c) The characteristic impedance of the line. 10

UNIT - III

- 3 (a) Describe the conversion of S parameters in terms of ABCD or vice-versa. 10
- (b) Draw the signal flow graph and equivalent ABCD matrix for cascaded two wave guide section for length $(l) = \frac{\lambda}{2}$ (each). 6

OR

- 3 (a) (i) If a lossless two port network is reciprocal show that $|S_{21}|^2 = 1 - |S_{11}|^2$
 (ii) If the losses two port network is non reciprocal, show that it is impossible to have unidirectional transmission, where $S_{12} = 0$ and $S_{21} \neq 0$.

3+3=6

- (b) What do you mean by discontinuities in microwave network. Explain the discontinuities in rectangular wave guide.

10

UNIT - IV

- 4 (a) Explain the working of Tunnel diode. Draw the energy band diagram under different bias conditions.

8

- (b) Explain the principle of operation of TRAPTI diode with suitable diagram.

8

OR

- 4 (a) Describe a small signal equivalent circuit model of MESFET. List out three main element which contribute to its non linear operation.

8

- (b) A typical n-type GaAs gunn diode has following parameters :

Thersold Field (E_{th}) = 2800 V/cm

Applied field (E) = 3200 V/cm

Device length (L) = 104 m

Dopping concentration (n_0) = $2 \times 10^{14} \text{ cm}^{-3}$

Operating frequency (f) = 10 GHz

Calculate following terms :

- (a) Electron driff velocity
 (b) Current density
 (c) Negative electron mobility

8

UNIT - V

- 5 (a) Write the differences between MMIC, and MIC and HIC in table form. 8
- (b) Describe the various MMIC fabrication techniques. 8

OR

- 5 (a) Explain the Thin Film inductors of MMIC with help of diagram. 8
- (b) Explain the basic properties provided by ideal conductor, dielectric and resistance materials used in MMIC. 8
-

- 1 (a) Design a 4 bit combinational circuit decrementer using four full-adder circuits. 8
- (b) Explain concept of bus and timings in Register Transfer. 8

UNIT - II

- 2 (a) Convert the following numerical arithmetic expression into reverse polish notation and show the stack operations for evaluating the numerical result. $(3+4) [10 (2+6) + 8]$ 10
- (b) What is the difference between immediate addressing mode and direct addressing mode ? 6

OR

- 2 (a) Explain instruction format in detail. 8
- (b) What must the address field of an indexed addressing mode instruction be to make it the same as a register indirect mode instruction ? 8

UNIT - III

- 3 (a) Derive an algorithm in flowchart form for adding and subtracting two fixed point binary numbers when negative numbers are in signed - 1's complement representation. 12
- (b) Why should the sign of the remainder after a division be the same as the sign of the dividend ? 4

OR

- 3 (a) Explain Booth's algorithm. 4
- (b) Show the step by step multiplication process using Booth algorithm, when the following binary numbers are multiplied. Assume 5-bit registers that hold signed numbers.
 $(+15) \times (+13)$ 12

UNIT - IV

- 4 (a) Explain micro-programmed controller in detail and how it is different from Hardwired control. 10
- (b) Explain Address Sequencer with a proper diagram. 6

OR

- 4 (a) Explain Micro instruction format for the control memory with an example of 20 bits code format. 10
- (b) Explain Horizontal and Vertical formats in brief. 6

UNIT - V

- 5 (a) A two way set associative Cache memory uses blocks of four words. The Cache can accommodate a total of 2048 words from main memory. The main memory size is $128\text{ K} \times 32$.
 (i) Formulate an pertinent information required to construct the Cache memory. 4
- (ii) What is the size of the Cache Memory ? 4
- (b) Write short note on DMA and explain how data are transferred using DMA. 8

OR

- 5 A virtual memory system has an address space of 8k words, a memory space of 4k words, and page and block sizes of 1k words as shown below :

Page 0
Page 1
Page 2
Page 3
Page 4
Page 5
Page 6
Page 7

Block 0
Block 1
Block 2
Block 3

Address Space

$$N = 8k = 2^{13}$$

Memory Space

$$M = 4k = 2^{12}$$

The following page reference changes occur during a given time interval.

4 2 0 1 2 6 1 4 0 1 0 2 3 5 7

Determine the four pages that are resident in main memory after each page reference change if the replacement algorithm used is

(a) FIFO (b) LRU.

16

Total Printed Pages : 3

6E3041

B. Tech. (Sem. VI) (Main / Back) Examination, April-May - 2018
Applied Electronics & Instrumentation Engg.
6AI1 Process Control Systems

**[Maximum Marks : 80
[Min. Passing Marks : 26**

*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 materials is permitted during examination.
(Mentioned in form No. 205)*

1. NIL _____ 2. NIL _____

UNIT - I

- 1 (a) Discuss the linearization of liquid level system and prove that the time constant is four times the holdup time for pressurized tank. 8
- (b) A thermometer is at room temperature of 25°C . It is suddenly put into a vessel containing boiling water at 100°C . What should be the time constant of the thermometer so that it indicates 99.9°C in 1 minute ? 8

OR

- 1 (a) Prove that response of a thermometer bulb is a first order system. Find its response for step input.

- (b) Discuss the concentration response of stirred tank. Also discuss the time constant with a first order reaction.

8

UNIT - II

- 2 (a) What is the servo operation and regulator operation ? Explain the proportioned control of a single capacity process with an equivalent block diagram. Draw the transient response of a single capacity process to a step change in set point.

8

- (b) A controller outputs a 4-20 MA signal to control motor speed from 140-600 rpm with linear dependance. Calculate

- (i) the current corresponding to 310 rpm
(ii) the value of current in (i) expressed as a percentage of control output.

8

OR

- 2 (a) Explain the effect of measurement lag and time delay in process control system.

8

- (b) Explain the effect of tank dynamics in context with level control system.

8

UNIT - III

- 3 (a) Explain process lag and measurement lag in flow control system.

8

- (b) Explain clearly the choice of controller for the control of noisy signals like pressure.

8

OR

- 3 (a) Explain the dynamics of steam heated exchangers along with suitable diagrams of temperature profiles.

8

- (b) Explain the different control schemes used to control heat exchangers.

8

227

UNIT - IV

- 4 How the overhead composition can be controlled by using direct method and indirect method ? Explain all methods in detail with suitable diagrams.

16

OR

- 4 (a) What is the need for controlling the reflux in a distillation column ? Give some schemes for internal reflux control.
- 8
- (b) Discuss different control schemes for controlling pressure in distillation column.

8

UNIT - V

- 5 Compare damped oscillation method and reaction curve method for finding optimum controller setting in "Process Control System".

16

OR

- 5 (a) For a unity feedback system, process transfer function is given by $G_p(s) = \frac{1}{s(s+1)(s+5)}$. The controller is of PID mode. Calculate the optimal values of controller parameter based on ultimate cycle method of tuning.

8

- (b) Write short notes on :
- (i) Cascade control
 - (ii) Override control.

4×2=8

6E6065

Roll No. : _____

Total Printed Pages : 3

6E6065

B.Tech. (Sem. VI) (Main & Back) Examination, April-May 2018
Applied Electronics & Instrumentation Engg.
6AI5 Microcontroller & Embedded System

Time : 3 Hours]

[Maximum Marks : 80]

[Min. Passing Marks : 26

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. Nil

2. Nil

UNIT - I

1 Explain in 8051 microcontroller

(a) Interrupts.

8

(b) PIN configuration.

8

OR

1 Explain in 8051 microcontroller

(a) Counters and timers.

8

(b) External memory.

8

UNIT - II

2 (a) Explain all addressing modes in 8051 microcontroller.

8

(b) Explain the jump and call instructions.

8

OR

2 Explain in context with 8051

(a) Byte level and bit level logical operations

8

(b) Push and pop operations.

8

UNIT - III

3 Explain :

(a) Maskable interrupts.

8

(b) Nonmaskable interrupts.

8

OR

3 Explain the structure of interrupts in 8051 in detail.

16

UNIT - IV

4 Explain in control with system design of 8051

(a) Parallel I/O ports interface.

8

(b) Digital and analog interfacing methods.

8

OR

4 Explain in context with system design of 8051

(a) Flash memory interfacing.

8

(b) LED array.

8

UNIT - V

5 Explain :

(a) Round Robin scheduling.

8

(b) Full pre-emptive scheduling.

8

OR

5 Explain :

(a) Features of commercial RTOS.

8

(b) WINCE and Embedded LINUX.

8

UNIT - II

- 2 (a) Explain various components of pneumatic system with block diagram. 8
- (b) Define activators and explain working of single acting cylinder. 8

OR

- 2 (a) Explain non positive displacement and positive displacement pump. 8
- (b) Enlist various types of control valves used in hydraulic system and explain one of them. 8

UNIT - III

- 3 (a) How DC motor can be controlled using pulse with modulation ? Explain. 8
- (b) Derive the relation between torque and speed of permanent magnet motor. 8

OR

- 3 (a) Explain working of direct current motor. 8
- (b) Explain the concept of breaking in DC motor. 8

UNIT - IV

- 4 (a) Explain operation of single phase AC motor. 8
- (b) Explain jogging and plugging in synchronous motor. 8

OR

- 4 Write short notes on :
- (i) Power factor correction in synchronous motor. 8
- (ii) Servo motors. 8

UNIT - V

- 5 (a) Explain programmable logic controller and network. 8
- (b) Explain counter and sequencer in relay. 8

OR

- 5 (a) Explain permanent magnet stepper motor with diagram. 8
- (b) Explain variable reluctance stepper motor with diagram. 8

6E6064

Roll No. : _____

Total Printed Pages : 3**6E6064**

B.Tech. (Sem. VI) (Main & Back) Examination, April-May 2018
Electronics Inst. & Control Engg.
6EI4A Biomedical Instrumentation

Time : 3 Hours]

[Maximum Marks : 80
[Min. Passing Marks : 26

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. NIL _____2. NIL _____**UNIT - I**

- 1 (a) Explain various elements of control nervous system with a suitable diagram. 8
- (b) Explain the electrode theory. Discuss the selection criteria for electrodes and transducers. 8

OR

- 1 (a) Describe the problems encountered in measurement of physiological system. Explain how these differ from physical systems? 8
- (b) List the various types of electrodes used in biomedical instrumentation and explain micro electrodes. 8

UNIT - II

- (a) Explain the basic electrocardiogram. Explain the different lead configuration employed in ECG monitoring. 8
- (b) Explain working principle of Electromagnetic Blood Flow Meter with suitable diagram. 8

OR

- (a) What is phonocardiograph ? Explain various techniques for measuring Heart Sounds. 8
- (b) Describe blood pressure measurement by direct and indirect measurement method. 8

UNIT - III

- (a) With the help of reactions explain the measurement of O_2 and CO_2 concentration in blood. 8
- (b) Explain the following : 4+4
- (i) Medical use of Isotopes
 - (ii) Endoscopy

OR

- (a) Explain the block diagram of X-ray machine. 8
- (b) Explain working principle of spectrophotometer. Discuss its applications in clinical laboratory. 8

UNIT - IV

- 4 (a) What are the various elements of Intensive Care in hospitals. Explain it briefly. 8
- (b) What are the physiological effects of electric current on human body ? 8

OR

- 4 (a) Why do we require Heart-lung machine ? Draw a block diagram of it and explain its working. 8
- (b) What is hemodialysis ? Explain the working of an artificial kidney with the help of diagram. 8

UNIT - V

- 5 (a) Explain the data acquisition and processing system used in patient monitoring. 8
- (b) Describe the criteria for identification of cardiac disorders. 8

OR

- 5 Write short note on : 16
- (i) Clinical applications on EEG, EMG and ERG
- (ii) Remote data recording and management.

6E6063

Roll No. : _____

Total Printed Pages : 3**6E6063**

B. Tech. (Sem. VI) (Main & Back) Examination, April-May 2018
Electronic Inst. & Control Engg.
6EI3A Industrial Measurements

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

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. NIL _____.2. NIL _____.**UNIT - I**

1 (a) Explain the working principle, merits and demerits of 2 wire and 3 wire system resistance temperature detectors. 8

(b) Explain the various types and applications of circular chart recorders. 8

OR

1 (a) Differentiate the following temperature transducers.

(i) Radiation pyrometers

(ii) Optical pyrometers. 8

(b) Explain the various calibration techniques of temperature sensors. 8

UNIT - II

- 2 Explain the following transducers with their applications, merits and demerits.
- (a) McLeod gauge 8
- (b) LVDT 8

OR

- 2 (a) Explain the calibration techniques of pressure transducers with merits and demerits. 8
- (b) Explain the construction and working of differential pressure transmitters. 8

UNIT - III

- 3 Explain the following transducers with their applications, characteristics, merits and demerits.
- (a) Pitot tubes. 8
- (b) Mass flow type meters. 8

OR

- 3 Explain the following transducers with their applications, characteristics, merits and demerits.
- (a) Vortex flow meters 8
- (b) Rotameters 8

UNIT - IV

- 4 (a) Explain the working of radioactive type transducers. Discuss its applications, merits and demerits. 8
- (b) Discuss about the bubbler (purge) system for level measurements with suitable diagram. 8

OR

- 4 Explain the following :
- (a) Radiation densitometer. 8
- (b) Electrical conductivity method for level measurements. 8

UNIT - V

- 5 (a) Explain the various configurations and applications, merits and demerits of Rosette Strain gauges. 8
- (b) Explain the importance of temperature compensation techniques used in strain gauges. 8

OR

- 5 (a) Differentiate the wire and foil type strain gauges. 8
- (b) Explain the various calibration techniques of strain gauges. 8

6E6062

Roll No. : _____

Total Printed Pages : 3**6E6062**

B.Tech. VI-Sem (Main & Back) Exam April-May 2018
Electronic Inst. & Control Engg.
6EI2A Fiber Optics & Instrumentation

Time : 3 Hours]

[Maximum Marks : 80
 [Min. Passing Marks : 26

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. _____ Nil _____ 2. _____ Nil _____

UNIT - I

- 1 (a) What is intermodal dispersion ? Drive expression for multimode step index fiber. 8
- (b) Find the core radius necessary for single mode operation of 1320 nm of step index fiber with $n_1 = 1.480$ and $n_2 = 1.478$. What are the numerical aperture and maximum acceptance angle of this fiber ? 8

OR

- 1 (a) Define the Relative Refractive index difference for an optical fiber and show how it may be related to the Numerical Aperture. 8
- (b) Explain the fiber band and scattering losses in optical fiber. 8

UNIT - II

- 2 (a) What is meant by stimulated emission of light in LASER ? Explain the working of (DFB) LASER and its characteristics. 8
- (b) Describe the optical characteristics of LED with suitable diagram. 8

OR

- 2 (a) What power is radiated by an LED if its quantum efficiency is 3% and the peak wave length is 670 nm ? 8
- (b) Compare the properties of laser diode and LED's used for optical communication. 8

UNIT - III

- 3 (a) Explain the structure features and working principle of PIN photodiode. 8
- (b) A photo diode is placed 1 inch apart from an LED whose peak emission wavelength 800 nm and output power of 0.42 mw and divergence angle 0.542 radians. Calculate the number of photons incident on the photo diode neglecting the transmission and reflection noises. 8

OR

- 3 (a) Explain the four basis components used in optical connectors. 8
- (b) A four multimode fiber FBFT coupler has 60 μw optical power launched into port 1. The measured output powers at port 4, 2 and 3 are 0.004, 26.0 and 27.5 μw respectively. Determine the excess loss, the insertion losses between the input and output ports, the cross talk and the split ratio for the device. 8

UNIT - IV

- 4 (a) What is the working principle of OTDR ? Explain the process of fault location identification through OTDR infield. 8
- (b) Explain measurement technique for diameter of optical fiber. 8

OR

- 4 (a) Explain how can you measure
(i) Cut off wave length
(ii) Refractive index profile 8
- (b) Explain laser based system for measurement distance with suitable diagram. 8

UNIT - V

- 5 (a) Explain the DWDM in optical fiber. 8
- (b) Write short notes on optical amplifiers. 8

OR

- 5 (a) Explain the following term related to WDM
(i) Coarse WDM
(ii) Dense WDM 8
- (b) An OTDR is used to measure the attenuation of a long length of fiber. If the optical power level measured by the OTDR at the 8 km point is 0.5 of the measured value at the 3 km point. What is the fiber attenuation ? 8

6E6061

Roll No. _____

Total No. of Pages : 7

6E6061

B. Tech. (Sem. VI) (Main&Back) Examination, April - May, 2018
 Electronic Inst. & Control Engg.
 6EI1A Process Control Systems

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

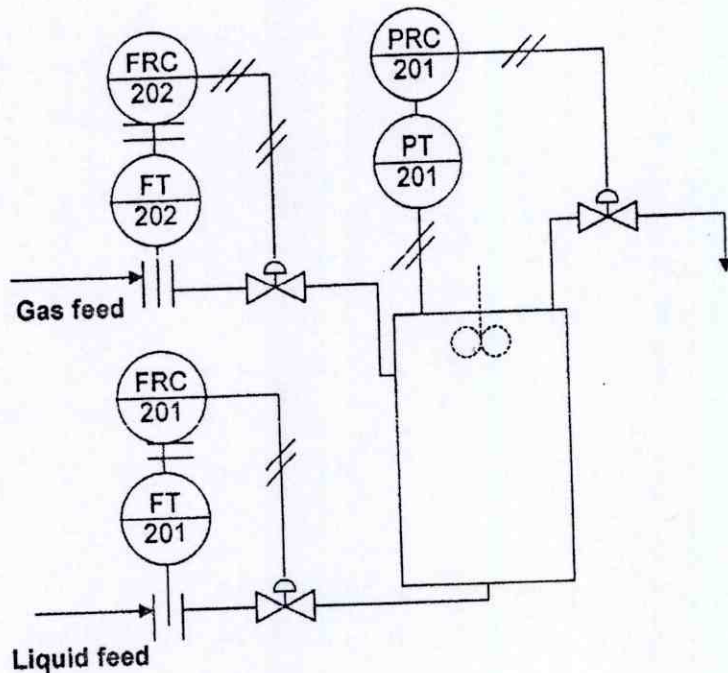
*Attempt any five questions, selecting one question from each unit.
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*Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)*

1. NIL 2. NIL

UNIT-I

- 1 (a) The following figure, shows piping and instrumentation diagram of CSTR. Explain the working of the control loop.
- Define the controlled variable and manipulated variable in the control loop.
 - Explain the working of the piping and instrumentation symbols FT202, FRC202, PT201, PRC201, FRC201 and FT201.
 - Explain functional identification in piping and instrumentation diagram.



8

- (b) What is the effect of dead-time in a chemical process ? What is the most widely used method to approximate the dead-time ? Show the effect of dead-time using appropriate figures and approximation.

8

OR

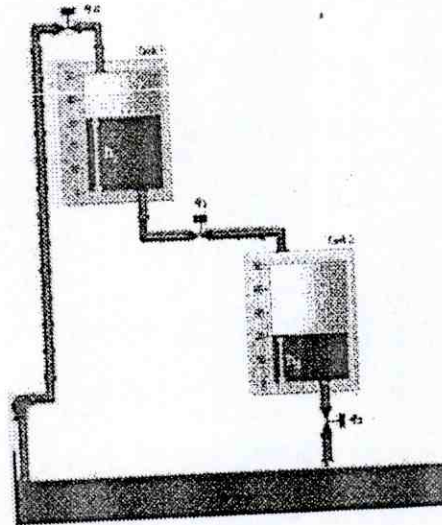
- 1 (a) What is the significance of piping and instrumentation diagram ? Define the term functional identification and loop identification in piping and instrumentation diagram.
- (b) Develop the mathematical model of two non-interacting tanks in series and determine the transfer functions relating the level of liquid in second tank to the inlet flow to the first tank and to the flow of the pump attached to the first tank. Do the transfer functions physically make sense ? Draw the block diagram of the process.

8

8

UNIT-II

- 2 (a) Consider a two tank non-interacting system as shown in the figure. The symbols considered are of usual meaning. State the mass-balance equation of the system, linearize the system and derive the transfer function model of the system. State any assumptions made.



8

- (b) Consider a function $f(x, y, z) = 2x^2 + xy^2 - 3\frac{y}{z}$. Find the linear approximation to the above nonlinear function at $\bar{x} = 1, \bar{y} = 2$ and $\bar{z} = 3$.

8

OR

- 2 (a) Find the transfer functions matrices for the systems represented by the following two sets of ODEs

$$\frac{dy_1}{dt} = 2y_1^2 + 3y_1y_2 + u_1 - u_2^3$$

$$\frac{dy_2}{dt} = \sqrt{y_2} - 4u_1u_2$$

8

- (b) Solve the following linear differential equation using Laplace Transform

$$\frac{d^2 y}{dt^2} + 3 \frac{dy}{dt} - y = 5t; \left. \frac{dy}{dt} \right|_{t=0} = 0; y|_{t=0} = 2$$

8

UNIT-III

- 3 (a) Using operational amplifiers, design the circuit diagram for a PID controller. Explain in detail about the working of the circuit. Find the transfer function of PID controller with respect to resistance and capacitance. Derive the expression for controller parameter in terms of resistance and capacitance.

8

- (b) Explain with proper block diagram and mathematical expression, anti-reset windup and actuator saturation in perspective of PID controller.

8

OR

- 3 (a) A unity feedback control system having a transfer function of $G(s) = \frac{16}{s^2 + 1.6s}$

By using proportional-derivative control, the damping ratio is to be made 0.8. Determine the value of T_d and find the rise time, peak time and overshoot of the system.

8

- (b) Consider a unity feedback control system whose forward path transfer function is represented by $G(s) = \frac{1}{s(s+1)(s+5)}$. Design a PID controller using Z-N tuning rule.

8

UNIT-IV

- 4 (a) Consider a feedback control system with controller transfer function $G_c(s)$, actuator transfer function $G_v(s)=2$, sensor $G_m(s)=0.25$ and plant $G_p(s)=\frac{4}{5s+1}e^{-s}$. Considering the controller as PID type controller, find the PID controller parameters (K_p, τ_i, τ_d) using Ziegler-Nichols tuning method. Approximate the delay in the process using Pade's approximation.

8

- (b) What are different types of control valves ? What is the difference between installed and inherent characteristics of control valve ? Plot the installed and inherent characteristics of the control valve. What is control valve sizing and how it is important for designing control valve ? What are the different parameters used for design of control valve.

8

OR

- 4 (a) A PI controller is used to control the temperature in a continuous stirred tank heater (CSTH). The temperature in CSTH varies from 20°C to 220°C. The control valve on steam inlet goes from fully-open to fully closed state when the pressure signal varies from 15 psi to 3 psi. A temperature variation of 10°C around the set point of 120°C changes the pressure signal of valve by 12 psi. Upon error change by 5°C, the control valve got fully closed after 1 min. Calculate K_p , PB and K_i . Assume that the valve was 50% open and temperature was at set-point at the beginning. Assume air-to-close valve.

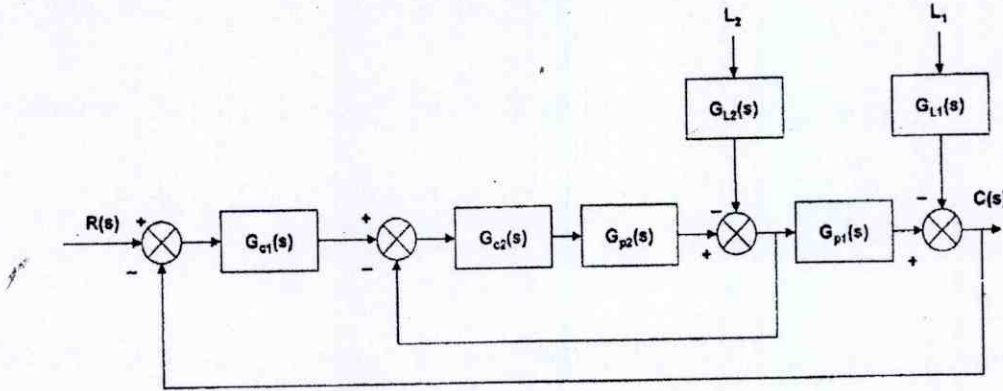
8

- (b) Derive the mathematical expression for flow through a pipe when installed in a piping system. Assume the total pressure as constant and pressure drop across the valve varying in nature. What is rangability of the control valve ?

8

UNIT-V

- 5 (a) What are the limitations of feedback controller and how cascade controller overcomes it ? Consider the following cascade control configuration and derive the expression for final output $C(s)$ in terms of $R(s)$, $L_1(s)$ and $L_2(s)$.



8

- (b) Considering a 2×2 MIMO process

$$G(s) = \begin{bmatrix} \frac{1.318}{20s+1} e^{-2.5s} & \frac{-1}{3s} e^{-4s} \\ \frac{0.038(182s+1)}{(27s+1)(10s+1)(6.5s+1)} & \frac{0.36}{s} \end{bmatrix} \text{ For the given MIMO process.}$$

find the Bristol's relative gain array (RGA) and comment on possible pairing.

5

- (c) Explain with proper figures and block diagram, how the override control protects the drum boiler from overheating.

3

OR

- 5 (a) Explain the principle of feedback plus feed-forward controller using appropriate block diagram. Derive the transfer function of feed-forward controller. State the advantages and disadvantages of feedback plus feed-forward controller.

5

- (b) Explain singular value decomposition and condition number for a MIMO process.

3

- (c) Explain the working principle of a distillation column. Mention the number of controlled variable, manipulated variable and disturbance variable. Provide a proper block diagram. Explain how override control is used to prevent flooding in distillation column with proper schematic and block diagram. Use Piping and instrumentation symbols for the schematic.

8

6E6054

Roll No. : _____

Total Printed Pages : 4**6E6054**

B.Tech. (Sem. VI) (Main & Back) Examination, April-May 2018
Electronics & Communication Engg.
6EC4A Digital Communication

Time : 3 Hours]

[Maximum Marks : 80

[Min. Passing Marks : 24

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. _____ Nil 2. _____ Nil

UNIT - I

- 1 (a) What are the various steps included in PCM ? Explain the significance of quantization in PCM. How can quantization error be reduced ? 8
- (b) Explain in detail the transmitter and receiver of DPCM along with suitable diagrams. 8

OR

- 1 (a) The bandwidth of an input signal to the PCM is restricted to 4 kHz. The input signal varies in amplitude from $-3.8V$ to $+3.8V$ and has the average power of 30 mW. The required signal to noise ratio is given as 20 dB. The PCM modulator produces binary output. Assuming uniform quantization,
- (i) Find the number of bits required per sample. 6

- (ii) Outputs of 25 such PCM coders are time multiplexed. What would be the minimum required transmission bandwidth for this multiplexed signal ?

2

- (b) What is Delta modulation ? Explain the advantages of ADM over DM.

8

UNIT - II

- 2 (a) Sketch the transmitted sequence of pulses for data stream 10110011101 for the following codes :

- (i) Unipolar NRZ
- (ii) Bipolar NRZ
- (iii) Polar RZ
- (iv) Manchester Format

8

- (b) Calculate the Power Spectral Density of NRZ unipolar format.

8

OR

- 2 (a) Describe matched filter and explain any two properties of matched filter.

8

- (b) Prove that the maximum SNR for the matched filter is found to be

$$\left(\frac{S}{N} \right)_{o,man} = \frac{2E}{N_0}$$

where, E is the energy of signal $x(t)$ $N_0/2$ is power spectral density of white noise.

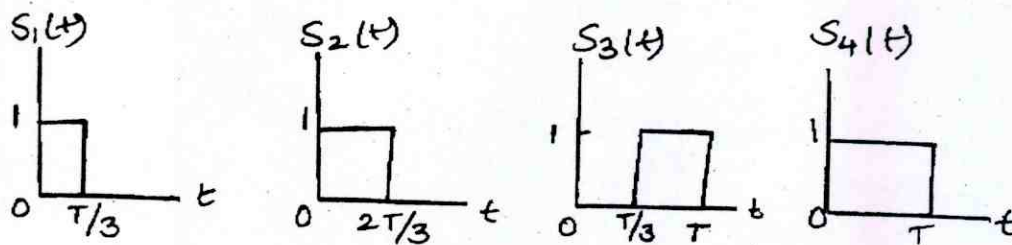
8

UNIT - III

- 3 (a) Explain generation and detection of Binary PSK. Also calculate probability of error of BPSK.

8

- (b) Consider the signals $S_1(t)$, $S_2(t)$, $S_3(t)$ and $S_4(t)$ shown in fig. below. 8



Use the Gram-Schmidt orthogonalization procedure to find an ortho-normal basis for the given set of signals.

OR

- 3 (a) Explain the signal space diagram of MSK and what is the difference between signal space diagram of MSK and QPSK. Also explain the working of MSK receiver. 8
- (b) Draw the BFSK and QPSK waveform for the data stream 10101011101. 8

UNIT - IV

- 4 (a) An analog signal band limited to 10 kHz is quantized in 8 levels of a PCM system with probabilities of $1/4$, $1/5$, $1/5$, $1/10$, $1/10$, $1/20$, $1/20$ and $1/20$ respectively. Find the entropy and the rate of information. 8
- (b) Prove that for a source generating M messages, entropy is $0 \leq H \leq \log_2 M$ 8

OR

- 4 (a) Consider a noiseless channel with m input symbols and n output symbols. Show that $H(x) = H(y)$ and $H(Y/X) = 0$. 8
- (b) Prove that the channel capacity of an ideal AWGN channel with infinite bandwidth is given by $C_\infty = 1.44 \frac{S}{\eta} \text{ b/s}$ where S is the average signal power and $\eta/2$ is the power spectral density of white gaussian noise. 8

UNIT - V

- 5 (a) Apply the Shannon fano coding procedure for the given message.

$$[x] = [x_1 \ x_2 \ x_3 \ x_4 \ x_5 \ x_6 \ x_7]$$

$$[P] = [0.4 \ 0.2 \ 0.12 \ 0.08 \ 0.08 \ 0.08 \ 0.04]$$

Assume $M = 3$

8

- (b) A cyclic (7,3) code has the generator polynomial

$$g(x)_z = x^4 + x^2 + x + 1$$

Find the generator matrix for this code, further find the minimum distance for the code.

8

OR

- 5 (a) The parity check bits of a (8,4) block code are generated by

$$C_5 = d_1 \oplus d_2 \oplus d_4$$

$$C_6 = d_1 \oplus d_2 \oplus d_3$$

$$C_7 = d_1 \oplus d_3 \oplus d_4$$

$$C_8 = d_2 \oplus d_3 \oplus d_4$$

where d_1, d_2, d_3 and d_4 are message bits.

- (i) Find the generator matrix and parity check matrix for this code.
- (ii) Find minimum weight of this code.
- (iii) Find the error detecting capabilities of this code.

3+3+3=9

- (b) Design an encoder for (7, 4) binary cyclic code generated by $g(x) = 1 + x + x^3$ and verify its operation using message vector 0101.

7

6E6058

Roll No. : _____

Total Printed Pages : 4**6E6058**

B.Tech. VI-Sem (Main & Back) Examination, April-May. 2018
Electronics & Communication Engg.
6EC6.3A Optical Fiber Communication

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

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. _____ Nil _____

2. _____ Nil _____

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) 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

OR

- 1 (a) Compare the single mode and multimode optical fiber. An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Determine :

- (i) The acceptance angle for the fiber in water which has a refractive index of 1.33;
- (ii) The critical angle at the core-cladding interface.

4+2+2

- (b) What is Dispersion ? Explain different types of dispersion. Why single mode fibers use in the commercial communication systems ?

2+4+2

UNIT - II

- 2 (a) Calculate the internal quantum efficiency for LED whose radiative and non-radiative life time are 2.5 ms and 60 ms respectively.

8

- (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) Describe the following characteristics of injection LASER;

- (i) Frequency chirp
- (ii) Noise
- (ii) Reliability
- (iv) Threshold current temperature dependence

2×4=8

- (b) Describe the optical characteristics of LED with neat sketch.

8

UNIT - III

- 3 (a) A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19} J are incident upon it.

- (i) At what wavelength is the photodiode operating ?
- (ii) Calculate the incident optical power required to obtain a photocurrent of $2.5 \mu A$ when the photodiode is operating as described above.

4+4

- (b) What is the difference between splices and connector ? Explain different types of splices with neat diagram.

2+6

OR

- 3 (a) A four port multimode fiber FBT coupler has $60 \mu W$ optical power launched into port 1. The measured output power at port 2, 3 and 4 are 0.004, 26.0 and $27.5 \mu W$ 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) Explain the following terms of photo diode.

- (i) Quantum efficiency
(ii) Responsivity

4+4

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.

8

- (b) What is the working principle of Optical time domain reflectometry (OTDR) ? Explain the process of fault location identification through OTDR in field.

4+4

OR

- 4 (a) Explain the frequency domain technique for measurement of dispersion with neat diagram.

8

- (b) Explain the Laser based system for measurement of distance with neat diagram.

8

UNIT - V

- 5 (a) Describe the Wavelength division multiplexing (WDM) and compare with dense wavelength division multiplexing (DWDM).

4+4

- (b) Write down the applications of optical communication in daily life. Also gives its advantages and drawbacks with classifications.

4+4

OR

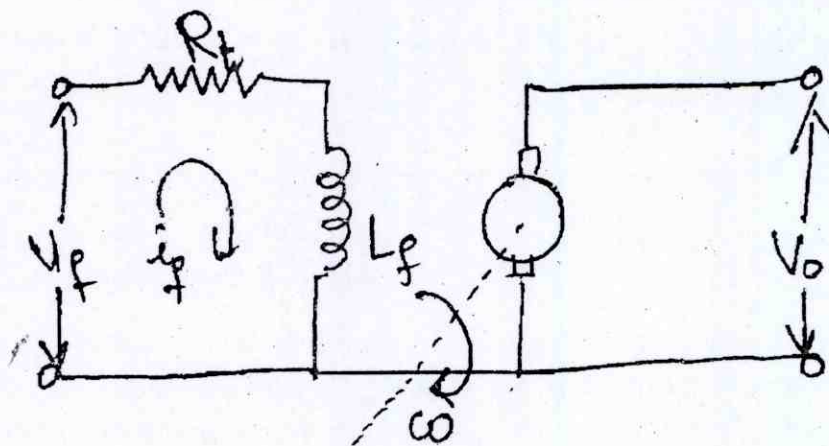
- 5 (a) What is the need of optical amplifiers ? Explain Erbium doped fiberamplifier (EDFA) with neat diagram.

2+6

- (b) Write short note on optical sensors.

8

- (b) Consider a dc shunt wound generator shown below rotating at constant speed and single voltage applied to its field. If the generator is open circuited, find transfer function $V_0(s)/V_f(s)$

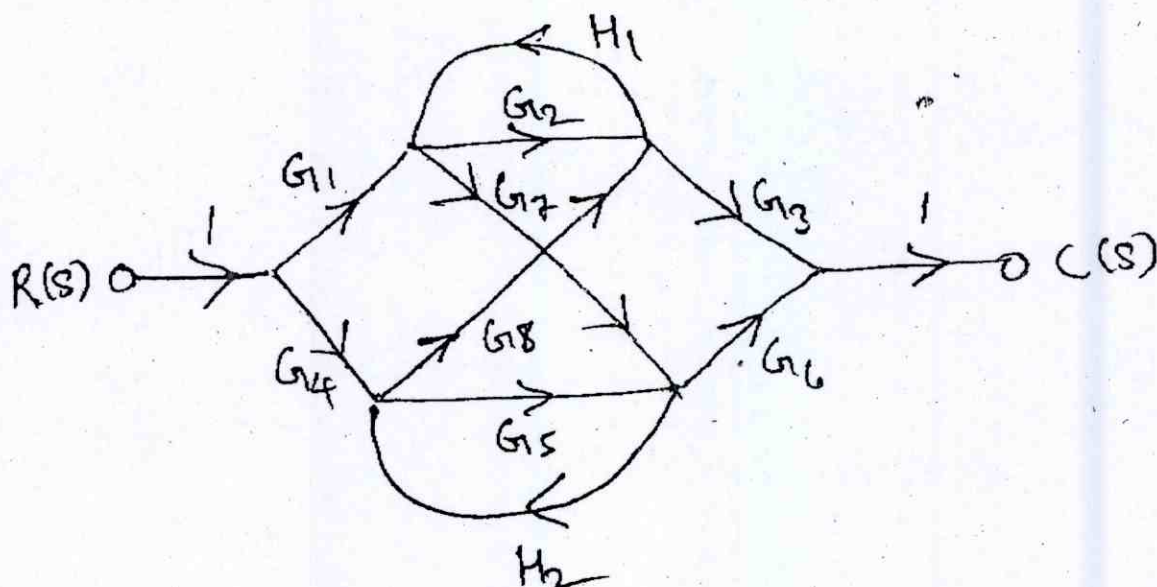


8

OR

- 1 (a) Explain the architecture of the closed loop control system with a neat block diagram with description of each block and signal.
- (b) Using the Mason's Gain formula, find the transfer function for the signal flow graph shown below.

8



8

UNIT - II

- 2 Determine the unit ramp response of the second order underdamped system and comment upon the obtained response.

16

OR

- 2 Determine the unit step response of the second order system for the
- (a) underdamped case
 - (b) critically damped case
 - (c) undamped case

16

UNIT - III

- 3 State the Nyquist stability criteria and sketch the complete Nyquist plot of the following OLTF :

$$G(s)H(s) = \frac{5}{s^2(s+2)} \text{ and comment upon the stability and relative stability of the corresponding OLTF.}$$

16

OR

- 3 A simplified form of the OLTF of an airplane with an autopilot in the longitudinal mode is $G(s)H(s) = \frac{K(s+a)}{s(s-b)(s^2 + 2sw_n s + w_n^2)}$; $a, b > 0$ such a

system involving an open loop pole in the right half s-plane may be conditionally stable. Sketch the root loci when $a = b = 1$, $Z = 0.5$, $w_n = 4$. Find the range of K.

16

UNIT - IV

- 4 Sketch the Bode Plot of the following transfer function and find GM and PM and comment upon the stability of the system.

$$G(s) = \frac{64(s+2)}{s(s+0.5)(s^2 + 3.2s + 64)}$$

16

OR

- 4 Write the short notes on the following :

16

- (a) M & N Loci
- (b) Nichols chart

UNIT - V

- 5 Derive the solution of the following state equation.

- (a) Homogeneous State Equation and
- (b) Non-homogeneous State Equation

16

OR

- 5 Explain all the canonical forms of the state equations and compare them.

16

UNIT - II

- 2 (a) What is current source inverter ? Explain working of single phase current source inverter with circuit diagram and draw the output waveforms. 10
- (b) A 230 V, 50 Hz, one pulse SCR controlled converter is triggered at a firing angle of 15° and the load current extinguishes at an angle of 180° , find the
- (i) Average output voltage
 - (ii) Average load current

6

OR

- 2 (a) A single phase half wave diode rectifier feeds power to RL load with free wheeling diodes. Describe the working of rectifier with relevant waveforms. 8
- (b) Explain the operation of three phase inverter in 120° mode of operation with suitable waveforms. 8

8

UNIT - III

- 3 (a) What is SMPS ? Describe SMPS using half bridge and full bridge configuration. 8
- (b) Explain the operation of forward converter. 8

8

OR

- 3 (a) Explain the working of uninterruptible power supply. 8
- (b) A set-up chopper has output voltage of two to four time the input voltage. For a chopping frequency of 2000 Hz, determine the range of off period for the gate signal. 8

8

UNIT - IV

- 4 (a) Explain the speed control of DC motors using choppers. 8
- (b) Describe static rotor-resistance control method for the speed control of a 3-phase induction motor. 8

OR

- 4 Explain the frequency controlled method for speed control of three phase induction motor and derive the expression of maximum torque for voltage and frequency controlled three phase induction motor. 16

UNIT - V

- 5 Write short notes on :
- (a) Three phase variable reluctance stepper motor
- (b) Dielectric heating control. 8+8=16

OR

- 5 (a) Explain the working and various characteristics of permanent magnet stepper motor. Compare the advantages and disadvantages with hybrid stepper motor. 12
- (b) Write advantages and disadvantages of induction heating. 4

6E6052

Total Printed Pages : 3

6E6052

B. Tech. (Sem. VI) (Main / Back) Examination, April-May 2018
Electronics & Communication Engg.
6EC2A Microprocessors

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

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. NIL 2. NIL

UNIT - I

- | | | | |
|---|-----|--|---|
| 1 | (a) | Draw the architecture diagram of 8085 microprocessor and explain function of various register. | 8 |
| | (b) | State the differences between static and dynamic RAM. | 8 |

OR

- 1 (a) Why are AD_0-AD_7 lines are multiplexed ? With the help of latching ckt., explain how these lines are demultiplexed. 8
- (b) Explain various addressing mode in 8085 Microprocessor with example. Also explain the Instruction format. 8

266

UNIT - II

- 2 (a) Write a program to load the data byte 8EH in register D and F7H in register E. Mask the high order bits (D_4-D_7) from both the data bytes, EX-OR the low order bits (D_0-D_3) and display the result and also draw the flow chart. 8
- (b) Explain the following instruction of 8085 Microprocessor :
- (i) LHLD
 - (ii) XTHL
 - (iii) DAA
 - (iv) STAXB

2×4=8

OR

- 2 (a) Write an assembly language program to add the following five data bytes stored in memory location starting at 2060 H. If the sum generates carry stop the addition and display O/H at the output port; otherwise continue adding the display the sum
Data : 98H, A2H, 39H, 22H, 42H 8
- (b) What are subroutines ? How they are useful ? 8

UNIT - III

- 3 (a) What do you mean by a Machine Cycle and T States ? What are basic machine cycle of 8085 microprocessor with their status signals ? 12
- (b) Find the maximum time delay which can be provided using one 8 bit register. The operating frequency of microprocessor is 2 MHz. 4

OR

- 3 (a) Draw the timing diagram of following instruction and also explain the same.
MVI B, 2EH
- (b) Explain Digital to Analog Converters. 8

UNIT - IV

- 4 (a) What do you mean by Masking of interrupts ? Explain SIM instruction. 8
- (b) Explain the interrupt structure of 8085, then describe the important PIN signal and instruction involved in handling the interrupt. 8

OR

- 4 (a) Explain data Synchronous and Asynchronous transmission in 8085 Microprocessor. 8
- (b) Write short note on serial I/O standards. 8

UNIT - V

- 5 (a) Draw and explain the block diagram of DMA controller. 8
- (b) Draw the functional block dig. of 8254 IC and explain various operating mode. 8

OR

- 5 (a) List the major components of 8279 key board/display controller and explain their function. 8
- (b) Explain operating mode of 8255 programmable peripheral interface. 8

6E6051

Roll No. : _____

Total Printed Pages : 4

6E6051

B.Tech. VI-Sem. (Main & Back) Examination, April-May 2018
Electronics & Communication Engg.
6EC1A Micriowave Engineering-II

Time : 3 Hours]

[Maximum Marks : 80
 [Min. Passing Marks : 26

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. Smith chart2. NIL

UNIT - I

- 1 (a) What does impedance matching imply ? Mention a few techniques used for realizing impedance matching at microwave frequencies?
- (b) Match a load impedance of $Z_L = 100 + j80$ to a 50Ω line using a single series open-circuited stub. Assuming that the load is matched at 24 Hz and that the load consists of a resistor and inductor in series, plot the reflection coefficient magnitude from 1 to 3 GHz.

8+8 = 16

OR

- 1 (a) Describe the procedure of load matching with quarter wave transformer for different types of loads. What are the advantages and shortcomings involved in this method ?

8

- (b) A lossless line of characteristics impedance $R_0 = 50 \Omega$ is to be matched to a load $Z_L = 50 / [2 + j(2 + \sqrt{3})] \Omega$ by means of a lossless short-circuited stub. The characteristic impedance of the stub is 100Ω . Find the stub position (closest to the load) and length so that a match is obtained.

8

UNIT - II

- 2 (a) What is varactor diode ? Discuss how the voltage variable capacitance of a varactor can be used for harmonic generation. What is a snap-off varactor ?

8

- (b) Describe the different modes of operation realizable with a Gunn diode.

8

OR

- 2 (a) Discuss the principle of operation of an IMPATT diode and explain the origin of negative resistance in the operation of such a device.

8

- (b) Explain the function of the PIN diodes. Describe its application as a single-pole PIN diode switches and single bit phase shifters.

8

UNIT - III

- 3 (a) What are the salient features of Si microwave bipolar transistors ? What are the three physical structures used for microwave transistors ? Explain it.

8

- (b) A GaAs has a thickness of $0.40 \mu m$ and a doping concentration N_A of $5 \times 10^{17} \text{ cm}^{-3}$. The relative dielectric constant ϵ_r of GaAs is 13.10. Calculate the pinch-off voltage in volts.

8

OR

- 3 (a) Discuss the structure and principle of operation of a MESFET device. 8
- (b) Derive the expression for transducer gain with unilateral transistor. Explain design criteria for maximum gain. 8

UNIT - IV

- 4 (a) Explain the construction, principle of working, and operation of a reflex Klystron. 8
- (b) A reflex Klystron operates at the peak of the $n = 2$ mode. The dc power input is 40 mW and $V_1/V_0 = 0.278$. If 20% of the power delivered by the beam is dissipated in the cavity walls, find the power delivered to the load. 8

OR

- 4 (a) Explain the construction and working of a cylindrical magnetron. Derive the equation for cut-off magnetic field for a cylindrical magnetron. 8
- b) An X-band pulsed cylindrical magnetron has the following parameters :
 Anode Voltage $V_0 = 26$ KV, beam current $I_0 = 27$ A, Magnetic flux density $B_0 = 0.336$ Wb/m², Radius of cathode cylinder $a = 5$ cm, Radius of vane edge to centre $b = 10$ cm.
 Compute :
 (i) The cyclotron angular frequency
 (ii) The cutoff voltage for a fixed B_0
 (iii) The cutoff magnetic flux density for a fixed V_0 .

2+3+3=8

UNIT - V

- 5 (a) Explain the velocity modulation and bunching process in two-cavity Klystron. Drive the expression for bunching parameters.

8

- (b) A two-cavity amplifier Klystron has the following parameters : Beam voltage $V_0 = 900$ V, Beam current $I_0 = 30$ mA, frequency $f = 8$ GHz, Gap spacing in either cavity $d = 1$ mm, spacing between centers of cavities $L = 4$ cm. Effective shunt impedance $R_{sh} = 40$ K Ω .

Determine :

- (i) The electron velocity
- (ii) The dc electron transit time
- (iii) The input voltage for maximum output voltage
- (iv) The voltage gain in decibels.

2×4=8

OR

- 5 (a) Explain in detail the operation of a helix-type TWT amplifier. Derive the electronic and circuit equations for TWT.

8

- (b) An O-type helix TWT operates at 8 GHz. The slow-wave structure has a pitch angle of 4.4 and an attenuation constant of 2 Np/m. Determine the propagation constant γ of the travelling wave in the tube.

8