## **P1233**

#### [5438]-101

#### M.Sc.

#### **ELECTRONIC SCIENCE**

## **EL1UT - 01 : Mathematical Methods in Electronics and Network** Analysis

## (2013 Pattern) (Semester - I) (Credit System)

Time : 3 Hours]

Instructions to the candidates:

- *1*) Attempt any five questions.
- 2) All questions carry equal marks.
- 3) Use of non-programmable calculator is allowed.

*Q1*) Answer the following:

- State and explain different type of modelling. Derive the mathematical a) model for ideal integrator and ideal differentiator circuit using op-amp.[4]
- Determine the unit step response to the series R-L circuit using differential **b**) equation. [3]
- c) Determine the Z parameters for the following Netowrk. [3]



#### *Q2*) Answer the following:

- The co-ordinates of a point in cylindrical system are  $(r, \theta, z) = (2, -\pi/4, z)$ a) 1) and the co-ordinates of a point in spherical system are  $(\rho, \theta, \phi) = \left(2, \frac{\pi}{4}, \frac{\pi}{3}\right)$ . Determine their co-ordinates in Cartesian system. [4]
- Solve following differential equation using Laplace transform **b**)  $\frac{d^2v(t)}{dt^2} + 6\frac{dv(t)}{dt} + 8v(t) = 2u(t) \text{ for subject to } v(0) = 1, v'(0) = -2.$ [3]
- Define the terms Mesh, Node and Loop. c)

[Total No. of Pages : 3

**SEAT No. :** 

[Max. Marks: 50

*P.T.O.* 

[3]

- **Q3**) Answer the following:
  - a) State initial and final value theorem. Find out initial and final value of following function. Verify your answer using f(t).  $f(s) = \frac{5(s+1)}{(s+2)(s+3)}.$ [4]
  - b) State and explain superposition theorem. Explain it's limitation. [3]
  - c) Write Bessel differential equation. List application of Bessel equation in physics and Electronics field. [3]
- *Q4*) Answer the following:
  - a) Convert T to Delta and Delta to T network of following circuit. [4]



b) Define *z* transform. Find *z* transform of exponential function. [3]

c) Find general solution of the following differential equations: [3]

i) 
$$\frac{dy}{dx} = 8y$$
 ii)  $x\frac{dy}{dx} + 2y = 3$ 

- **Q5**) Answer the following.
  - a) What is mean by partial differential equation? Give its applications in physics and Electronics. [4]

[3]

- b) Find Laplace transform of
  - i)  $\cosh(at)$  ii)  $\sinh(at)$
- c) State Norton theorem for dc circuit. Find Norton equivalent circuit for following circuit. [3]



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- *Q6*) Answer the following:
  - a) State maximum power transfer theorem for dc circuit. Find maximum power available for following network. [4]



b) Define signal. Explain standard test signals used in Electronic Laboratory.

[3]

c) For the given denominator polynomial of a network function, determine the stability of network. [3]

 $D(s) = s^{5} + s^{4} + 3s^{3} + 3s^{2} + 6s + 4$ 

- *Q7*) Answer the following:
  - a) What is analogus system? Explain how electrical system can be analogus to translational mechanical system. [5]
  - b) Use separation variable to solve 3-dimensional Laplace equation in Cartesian co-ordinates. Obtain it's solution. [5]
- *Q8*) Answer the following:
  - a) Define the convolution theorem. Find f(t) using convolution of following

network 
$$f(s) = \frac{2s}{(s+1)(s^2+4)}$$
. [5]

b) Compare state variable approach over transfer function approach. Find the state space representation of the circuit as shown in following figure where  $V_s$  is the input and  $i_x$  is the output. [5]



 $\mathfrak{H}\mathfrak{H}\mathfrak{H}$ 

**SEAT No. :** 

## **P1234**

#### [5438]-102

#### **M.Sc.** - **I**

## **ELECTRONIC SCIENCE**

**EL1UT02: Analogue Circuit Design** 

## (2013 Pattern) (Credit System) (Semester-I)

Time : 3 Hours] Instructions to the candidates:

- 1) Attempt any five questions.
- All questions carry equal marks. 2)
- 3) Use of log table/ non-programmable calculator is allowed.
- Figures to the right indicate full marks. **4**)

*Q1*) Attempt the following:

a)	Explain switching c	haracteristics of P-N junction diode.	[4]
----	---------------------	---------------------------------------	-----

- Compare MOSFET and JFET. [3] b)
- Draw circuit diagram of collector- emitter feedback bias. Derive expression c) for its stability factor 'S'. [3]

## **Q2**) Attempt the following:

- What is clipper? With circuit diagram and waveforms explain the working a) of positive and negative externally biased series type clipper. [4]
- Explain different types of distortion in amplifier. [3] b)
- Determine the input impedance, voltage gain and current gain of the CE c) amplifier given below using h-parameter with  $h_{ie} = 3.2 \Omega$  and  $h_{fe} = 100$  at the operating conditions. [3]



[Max. Marks : 50

[Total No. of Pages : 3

- *Q3*) Attempt the following:
  - a) With the help of circuit diagram, explain the operation of RC phase shift oscillator using BJT. Write the expression for frequency of oscillations of it. [4]
  - b) How will you determine h-parameters from characteristics of CB configurations. [3]
  - c) State the circuit parameters such as input impedance, output impedance and closed loop gain for inverting and non-inverting amplifier. [3]
- *Q4*) Attempt the following:
  - a) Draw the circuit diagram of practical integrator. What are the practical design consideration for integrator circuit using op-amp. [4]
  - b) In a Hartley oscillator, the value of capacitor in the tuned circuit is 500pf and the two sections of coil have inductances 38  $\mu$ H and 12  $\mu$ H. Find the frequency of oscillations and the feedback factor  $\beta$ . [3]
  - c) Write a short note on "frequency compensation (phase compensation) for an op-amp". [3]

#### **Q5**) Attempt the following:

- a) What is tuned amplifier? Distinguish between double tuned and staggeer tuned amplifier. [4]
- b) Explain frequency response of multistage amplifier. [3]
- c) Draw the circuit diagram of Wein-bridge oscillator. Find the value of capacitor if R is 100 kΩ and frequency of oscillation is 20 kHz for Wein-bridge oscillator. [3]
- Q6) Attempt the following:
  - a) What are the different coupling schemes used in amplifiers? Explain each. [4]
  - b) Explain with circuit diagram, capacitance coupled single tuned amplifier. [3]
  - c) A tank circuit has a capacitor of 100 pf and an inductor of 50  $\mu$  H. The resistance of the inductor is 10  $\Omega$ . Find the resonant frequency, bandwidth and Q-factor. [3]

- Q7) Attempt the following:
  - a) With the proper circuit diagram, explain the working of transducer bridge amplifier. [5]
  - b) Obtain the value of  $R_1$ ,  $R_2$ ,  $R_c$  and  $R_E$  for single stage RC coupled amplifier using transistor; if  $V_{cc}=10V$ ,  $I_c=4mA$ . [5]
- *Q8*) Attempt the following:
  - a) Draw the block diagram of PLL and explain the function of each block.What is lock range and capture range. [5]
  - b) With the help of neat sketches and characteristic curves, explain the operation of junction FET. Show the different regions of the output characteristics of a JFET. [5]



SEAT No. :

P1235

## [5438]-103

## **M.Sc.** - **I**

## **ELECTRONIC SCIENCE**

# EL1 UT 03 : Digital System Design

## (2013 Pattern) (Credit System) (Semester - I)

#### Time : 3 Hours

Instructions to the candidates:

- Answer any five questions. 1)
- All questions carry equal marks. 2)
- Use of log tables/non programmable calculator is allowed. 3)
- 4) Figures to the right indicate full marks.

**Q1**) Attempt the following:

- Explain design flow for digital system design using verilog HDL. [4] a)
- Implement the following function using 4 : 1 multiplexer b) [3]  $F(A, B, C) = \Sigma m (1, 3, 5, 6)$
- Explain with neat diagram architecture of CPLD. c) [3]

## *Q2*) Attempt the following:

- Write the verilog code for 4:1 MUX using dataflow and behavioral a) modeling. [4]
- State the advantages of PLD's over fixed function IC's. List various b) types of PLD's. [3]
- Write verilog code for c)



## **Q3)** Attempt the following:

Draw the truth table with 3-input variables A, B, C and P, Q as output a) variables for following [4]

P is LOW when all inputs are same

Q is HIGH when exactly one input is HIGH

Write SOP expression for P, Q and implement it using logic gates.

[3]

[Max. Marks : 50

[Total No. of Pages : 3

	b)	Implement the following using PAL [3 $F_1(A, B, C) = \Sigma m (1, 4, 5, 7)$ $F_1(A, B, C) = \Sigma m (1, 2, 3, 6)$
	c)	Explain different loop structures used in verilog. [3]
Q4)	Atte	mpt the following:
- /	a)	Design synchronous counter for sequence [4 $0 \rightarrow 1 \rightarrow 3 \rightarrow 6 \rightarrow 7 \rightarrow 5 \rightarrow 0$ using JK flip flop.
	b)	Design 2-bit magnitude comparator. [3
	c)	Write excitation table and draw state diagram for JK flip flop and write verilog code for it. [3
Q5)	Atte	mpt the following:
- /	a)	Write a verilog code for 4-bit ring counter using behavioral modelingWrite test bench for 4-bit ring counter.[4]
	b)	Design 3-bit binary to gray converter. [3
	c)	Minimize the following expression using K-map and realize using logic
		gates. [3
		$Y(A, B, C, D) = \Sigma m (2, 3, 5, 6 11, 12, 15)$
Q6)	Atte	empt the following:
	a)	Write the verilog code for[4]
		i) 4-bit ALU
		ii) 8 to 3 priority encoder
	b)	If $X = 4^{\circ} b 1010$ [3
		Y = 4' b1011
		Z = 4' b10X1
		Find output of following
		i) X & Y
		ii) X   Y
		iii) X ^~ Y
		iv) X & Z
		v) & X
		vi) $P = X >> 1$
	c)	Explain with circuit diagram 4-bit parity generator and checker. [3

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- *Q7*) Attempt the following:
  - Draw and explain architecture of FPGA. List applications of FPGA.[5] a)
  - [5] b) Write verilog code for traffic light control using FSM.
- *Q8*) Attempt the following:
  - Explain with neat diagram SRAM memory cell. Explain 'write' operation a) with the help of timing diagram. [5]
  - b) Design stepper motor sequence generator using FSM. What should be clock frequency to rotate stepper motor with 240 rpm. [5]



SEAT No. :

P1236

## [5438]-104

#### **M. Sc. - I**

## ELECTRONIC SCIENCE

## EL1UT - 04 : Advanced 'C' Programming (2013 Pattern) (Credit System) (Semester - I)

Time : 3 Hours]

[Max. Marks : 40

[Total No. of Pages : 2

Instructions to the candidates:

- 1) Attempt any four questions.
- 2) All questions carry equal marks.
- 3) Figures to the right indicates full marks.

**Q1)** Answer the following :

- a) Explain with example the command line argument in C. [4]
- b) Discuss with suitable example the conditional statements in C. [3]
- c) Write a C-language program to find smallest number from given n numbers. [3]

#### Q2) Answer the following :

	a)	Write a C-prog	gram to draw s	symbol of JFET	using graphics command	s.[4	η
--	----	----------------	----------------	----------------	------------------------	------	---

- b) State the features of object oriented programming. [3]
- c) Give the difference between public and private class. [3]

#### **Q3)** Answer the following :

- a) Write a C-program to find the sum of digits of 4-digit integer number.[4]
- b) State different types of memory allocations in C. [3]
- c) What is polymorphism? Give its types. [3]

- *Q4*) Answer the following :
  - a) Explain functions available in C language to access the parallel port of computer. [4]
  - b) Write a C-language program to find factorial of a given number using recursive function. [3]
  - c) Explain the following functions of file handling. [3]
    - i) fgetc() ii) rewind()
- *Q5*) Answer the following :
  - a) Differentiate between Pointer (\*) and address (&) operator with suitable example.
     [5]
  - b) Write a C-program to calculate the resistance value using color code table.
     [5]
- *Q6*) Answer the following :
  - a) Write a C-program to reverse a string using pointers. [5]
  - b) Write a note on video adapter and video graphics modes. [5]

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## P1237

#### SEAT No. :

[Total No. of Pages : 2

#### [5438]-201

## **M.Sc.** - **I**

## **ELECTRONIC SCIENCE**

## EL2UT05 : Applied Electromagnetics, Microwave and Antennas (2013 Pattern) (Credit System) (Semester - II)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer any five questions.
- 2) All the questions carry equal marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of non-programmable calculators is allowed.

Q1) Answer the following questions :

- a) Starting with Maxwell's equations, obtain the electric and magnetic field wave equations in time domain. [4]
- b) A uniform transmission line has constants  $R = 12 \text{ m}\Omega\text{m}^{-1}$ ,  $L = 1.5 \mu\text{Hm}^{-1}$ ,  $G = 1.4 \mu \sigma \text{m}^{-1}$  and  $C = 1.4 \text{ nFm}^{-1}$  at 7 KHz frequency. Find its characteristic impedance. [3]
- c) State the formula for cut off frequency for a rectangular waveguide involving guide parameters and medium in the waveguide in case of TE wave. Explain precisely each term in it. [3]
- **Q2**) Answer the following questions :
  - a) An airfilled rectangular waveguide of inside dimensions  $7 \times 3.5$  cm operator in dominant TE<sub>10</sub> mode. Find the cutoff frequency and phase velocity of wave in the guide at a 3.5 GHz frequency. [4]
  - b) Write a short note on Skin effect. [3]
  - c) What is Smith chart? What are its important characteristics? [3]
- Q3) Answer the following questions :
  - a) i) Write the Maxwell's equations in integral and differential form. [2]
    - ii) What is reflection and transmission coefficient of transmission line?
  - b) What is a waveguide? What are the waveguide components? [3]
  - c) Write a short note on Yogi Uda antenna.

*P.T.O.* 

[2]

[3]

- **Q4**) Answer the following questions :
  - a) Explain the working of a reflex klystron using its schematic diagram.[4]
  - b) The electric field for a TEM wave is 100 V/m. Calculate the velocity and magnitude of poynting vector for the wave in air. [3]
  - c) What are the various types of power losses in a rectangular waveguide? [3]
- Q5) Answer the following questions :
  - a) Why impedance matching is necessary in transmission lines? Describe any two methods of impedance matching on transmission lines. [4]
  - b) Find the depth of penetration of an electromagnetic wave of frequency 1 MHz in copper.  $[6 = 5.8 \times 10^7 \text{ mho/m}]$  [3]
  - c) What is cavity resonator? Explain Q-factor of cavity resonator. [3]

*Q6*) Answer the following questions :

	[4]
b) Explain single stub matching of transmission line with necessary diagr	am.
	[3]
c) Compare the circular waveguide and optic fiber.	[3]

- Q7) Answer the following questions :
  - a) For a plane wave propagating through a conductor show that  $\alpha = \beta = \sqrt{\pi \rho \mu 6}$  where  $\alpha$  is attenuation constant,  $\mu$  is permeability,  $\beta$  is phase constant and 6 is conductivity of the medium. [5]
  - b) What is Gunn effect? Draw the schematic diagram of n-type GaAs diode and explain the Gunn effect. [5]
- *Q8*) Answer the following questions :
  - a) A transmission line has a characteristic impedance of  $50 + j0.01\Omega$  and is terminated in a load impedance of  $73 j42.5\Omega$ . Find the reflection coefficient and the standing wave ratio. [5]

[5]

- b) Write short note on :
  - i) End fire antenna.
  - ii) Broadband antenna.

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## P1238

SEAT No. :

[Total No. of Pages : 3

[5438]-202

## **M.Sc.** - **I**

## **ELECTRONIC SCIENCE**

## EL2UT06 : Instrumentation and Measurement Techniques (2013 Pattern) (Credit System) (Semester - II)

*Time : 3 Hours]* 

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer any five questions.
- 2) All questions carry equal marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of non-programmable calculator is allowed.

Q1) a) Prove that for shunt connected instrument, the measured voltage is given

by 
$$E_L = \frac{E_0}{\left(1 + \frac{Z_0}{Z_L}\right)}$$
.

What type of error involved in the measurement? How to minimize it?[4]

- b) Classify transducers according to transduction principle used and energy requirement. [3]
- c) List the advantages of electronic instruments over mechanical and electrical. [3]
- **Q2)** a) Define static sensitivity, Dead zone and Resolution. A moving coil voltmeter has uniform scale with 100 divisions, the full scale reading is

100 V and  $\frac{1}{10}^{\text{th}}$  scale division can be estimated with fair degree of

uncertainty. Determine the resolution of the voltmeter. [4]

b) A voltmeter having sensitivity of  $10 \text{ k}\Omega/\text{V}$  reads 100V on its 150 V scale, when connected across an unknown resistor in series with milliammeter, when it reads 5 mA current. [3]

Calculate :

- i) Apparent resistance of unknown resistor.
- ii) Actual resistance of the unknown and
- iii) Error due to loading effect of voltmeter.

- c) Define Accuracy and precision. "Precision is composed of conformity and number of significant figures". Comment with suitable example. [3]
- Q3) a) What is dynamic response of measurement system? Describe First order system for step input. [4]
  - b) A temperature probe is transferred from air at 25°C to air at 35°C, then to water at 70°C and back to air at 35°C. In each case the transfer is instantaneous. The effective time constant and the timing sequence is :

In air dry probe  $\tau = 30$  sec.

```
In water \tau = 5 sec.
```

In air wet probe  $\tau = 20$  sec.

for t < 0, T = 25°C Initial temperature,

0 < t < 7, T = 35°C dry probe in air,

- 7 < t < 15, T = 70°C probe in water and
- 15 < t < 30, T =  $35^{\circ}$ C wet probe in air.

Calculate the temperature indicated at the end of each time interval. [3]

- c) List the different type of errors involved in measurement. A resistance is determined by voltmeter. Ammeter method, the voltmeter reads 100V with probable error of  $\pm$  12V and the ammeter reads 10A with probable error of  $\pm$  2A. Determine the probable error in the computed value of resistance. [3]
- Q4) a) Derive the expression for voltage across the capacitor with time for first order electrical system. [4]
  - b) Describe linear approximation of non-linear system. A resistance temperature detector (RTD) with steady state gain of  $0.3925 \Omega$ /°C and a time constant of 5.5 sec experiences a step change of 75°C. Before the temperature change, it has a stable 100 $\Omega$  resistance. Write the time domain equation for resistance and find its value after 15 sec of application of step input. [3]
  - c) State the selection criteria of transducer for the measurement of physical parameters. [3]
- Q5) a) List the transducers used for displacement measurement. State advantages of strain gage and LVDT. [4]
  - b) A strain gage is bonded to a beam of 0.1m long and has cross sectional area 2 cm<sup>2</sup>. Young's modulus of steel is 207 GN/m<sup>2</sup> and the unstrain resistance is of 240 $\Omega$  with gage factor 2.2. When a load is applied, the gage resistance changes by 0.013 $\Omega$ . Calculate the change in length of the steel beam and the amount of force applied. [3]

c) The output of LVDT is connected to a 5V voltmeter through an amplifier of amplification factor 250. The voltmeter scale has 100 divisions and

the scale can be read to  $\frac{1}{5}^{\text{th}}$  of the division, an output of 2mV appears across the terminals of LVDT, when the core is displaced through a distance of 0.5 mm. Calculate : [3]

- i) The sensitivity of LVDT.
- ii) The sensitivity of the whole setup.
- iii) The resolution of the instrument.
- Q6) a) List the basic methods of force measurements. A mild steel shaft is used to connect a motor drive to a constant load torque. To measure the torque, a resistance strain gage with resistance of  $120\Omega$  and gage factor 2 is mounted at 45° to the shaft axis. The shear modulus of steel is 80 GPa, shaft diameter is 50 mm and change is gage resistance due to load is  $0.1\Omega$ . Find the load torque. [4]
  - b) Give the comparison between resistance thermometer and thermocouple.

[3]

[3]

- c) Describe inductive transducers with
  - i) Change in self inductance.
  - ii) Change in mutual inductance and
  - iii) Production of eddy current.

Give at least one application of each.

- Q7) a) List the pressure transducers. Give different methods of pressure measurements. Describe working principle of Ionization gage. [5]
  - b) Classify flow meters. Write working principle of Ultrasonic flow meter. For ultrasonic flow meter a bear frequency of 1000 cps. The angle between transmitter and receiver is 45°, and the sound path is of 12 inches. Calculate the fluid velocity in m/sec. [5]
- Q8) a) Give classification of temperature transducer. Describe thermistor and resistance thermometer.
   A platinum resistance thermometer has a resistance of 100Ω at 25°C. Find its resistance at 65°C and find temperature for 150Ω resistance. The temperature coefficient of platinum is 0.00392/°C. [5]
  - b) Describe working principle of radiation pyrometers. State their types, specification and advantages. [5]

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SEAT No. :

## P1239

#### [5438]-203

#### **M.Sc.** - **I**

# ELECTRONIC SCIENCE

## EL2UT07 : Embedded System Design

## (2013 Pattern) (Credit System) (Semester - II)

Time : 3 Hours]

[Max. Marks : 50

[Total No. of Pages : 4

Instructions to the candidates:

- 1) Answer any four questions.
- 2) All the questions carry equal marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non-programmable calculators is allowed.

Q1) Answer the following questions :

a) Compare RS232 and RS485 bus standards. Write a 'C' program for PIC 18 F458 or PIC 18 F4550 to transfer the message "ELECTRONICS" serially at 9600 baudrate. Assume XTAL = 10 MHz to determine the value of SPBRG register. [4]

CSRC	TX9	TXEN	SYNC	0	BRGH	TRMT	TX9D
D7							D0

TXSTA : Transmit status & control register.

-	-	RCIF	TXIF	-	-	-	-
DIDA							

PIR1 : Peripheral interrupt register 1.

- b) What is an embedded system? What are its characteristics? Draw block diagram of a typical embedded system & explain all the components in it.
   [3]
- c) Write a C program for ATMEGA16 microcontroller to implement 8-bit Johnson counter on 8 LED's connected to PORTB. [3]
- **Q2**) Answer the following questions :
  - a) i) Draw data memory map of PIC18F458 or PIC 18F4550. What is Access bank in it? [2]
    - ii) Explain any four instructions used to access RAM bitwise. [2]
  - b) Draw the interface of 2 digit multiplexed display using. Comman cathode SSD's to ATMEGA16. Write a 'C' program to implement a two digit BCD Counter. [3]
  - c) State the difference between RISC and CISC architecture. [3]

*P.T.O.* 

- *Q3*) Answer the following questions :
  - a) Write a 'C' program for ATMEGA 16 to toggle LED connected at PORTD bit O continuously at 1 Hz frequency. Use timer 1, Normal mode, 1 : 256 prescalar to create the delay. Assume XTAL = 8 MHz[4] TCCR1A

	(	COM1A1	COM1A0	COM1B1	COM1B0	FOC1A	FOC1B	WGM11	WGM10
	TCC	CR1B							
		ICNC1	ICES1	_	WGM13	WGM12	CS12	CS11	CS10
	TIF	R							
		OCF2	TOV2	ICF1	OCF1A	OCF1B	TOV1	OCF0	TOV0
b)	Dese	cribe the	PIC18F	458 or P	IC18F45	50 micr	ocontro	oller statu	us registe
	in sh	nort.							
	Find	the C, Z	Z & DC 1	flags for	each of t	he follo	wing		
	i)	MOVL	$W = 0 \times 3$	3F	ii)	MOV	<b>VLW</b>	0×99	
		ADDL	W $0 \times 4$	45		ADD	LW	0×58	
	iii)	MOVL	W 0×I	F <b>5</b>	C				
		ADDL	W 0×0	)B		2			[3
c)	Writ	e a note	on SPI	protocol.					[3
Ans	wer th	ne follov	ving :						
a)	Writ	the ou	tput of e	ach instr	uction in	the foll	lowing	code and	d state the
	purp	ose of t	he code.						[4
	MY	NUM 🖉	EQU	0	×20				

EQU	0×20
MOVLW	0×34
ANDLW	0×0F
MOVWF	MYNUM
SWAPF	MYNUM, F
MOVLW	0×37
ANDLW	0×0F
IORWF	MYNUM, F

- b) Draw interface of a 4 × 4 keyboard to ATMEGA16. With the help of a flowchart, explain the steps to detect the keypress. [3]
- c) Compare assembly language programming & 'C' programming for microcontroller.

What is IDE? What are typical IDE's used for PIC & AVR based system design. [3]

*Q4*)

- *Q5*) Answer the following questions :
  - a) Draw interfacing of DAC 0808 to ATMEGA16 microcontroller. Write C program to generate a stair step ramp waveform. [4]
  - b) Draw neat circuit diagram of target board of PIC18F458 or PIC18F4550, Show [3]
    - i) Reset and oscillator circuit.
    - ii) In Circuit Serial Programming (ICSP) pin connections.
  - c) What is I2C? List I2C devices which can be interfaced with microcontroller. State advantages of I2C over SPI. [3]
- *Q6*) Answer the following :
  - a) Draw architecture of ATMEGA16 and explain it in short. [4]
  - b) Draw interface of LDR and bulb (using relay) to PIC18F458 or PIC18F4550. Write C program to implement light ON-OFF controller.

[3]

c) Explain with examples any four addressing modes of AVR. If C = 1, R1 = 95H and R2 = 4FH prior to execution of "SBC R1, R2", what will be the contents of R1 and C after subtraction in AVR microcontroller?

[3]

#### Q7) Answer the following:

a) Draw interface of temperature sensor LM35 and DC motor to ATMEGA16. Write 'C' program to control the speed of DC motor automatically according to temperature. [5]
 ADMUX :

AD	ADMOX.											
	REFS1	REFS0	ADLAR	MUX4	MUX3	MUX2	MUX1	MUX0				
ADCSRA												
	ADEN	ADSC	ADATE	ADIF	ADIE	ADPS2	ADPS1	ADPS0				
TCO	TCCRO											
	FOC0	WGMO0	COMO1	COM00	WGM01	CSO2	CSO1	COSO0				
i)	What a	are the cr	iteria the	e designe	er shoul	d consi	der in c	hoosing a				

- microcontroller for embedded system development. [3]
  - ii) Explain in short development cycle of embedded system. [2]

b)

- **Q8**) Answer the following :
  - Draw a block diagram of a car parking controller using PIC18F458/ a) PIC18F4550. Assume INTO pin of PIC microcontroller is connected to IR entry sensor. INT1 pin is connected to IR exit sensor. Display total number of cars present using 4-LED's connected to PORTD.0 to PORTD.3. Activate parking full indicator when number of cars entered are 15. Write 'C' program to implement car parking system. [5]

INTCON :	(	GIE	-	-	INTOIE	-	INTF	-
INTCON3 : [	-	-	-	-	INT1IE	-	-	INT1TF

b) Explain the following communication standards : [5]

- i)
- ii)

SEAT No. :

## P1240

#### [5438]-204

#### **M.Sc.** - **I**

## ELECTRONIC SCIENCE EL2UT 08 : Foundation of Semiconductor Devices (2013 Pattern) (Semester - II) (Credit System)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 40

[Total No. of Pages : 2

Instructions to the candidates:

- 1) Answer any four questions.
- 2) All questions carry equal marks.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Figures to the right side indicate full marks.
- 5) Use of Non-programmable calculator is allowed.
- **Q1**) Attempt the following.
  - a) Explain the working of heterojunction bipolar transistor (HBT). [4]
  - b) 'In n-type semiconductor the position of the Fermi energy level is above the donor energy level at absolute zero temperature.' Comment. [3]
  - c) A Si sample is doped with  $10^{16}$  cm<sup>-3</sup> boron atoms and a certain number of shallow donors. The Fermi level is 0.36eV above  $E_i$  at 300K. What is the donor concentration  $N_d$ ? (Given ni =  $1.5 \times 10^{10}$  cm<sup>-3</sup>) [3]
- *Q2*) Attempt the following.
  - a) With the help of schematic band diagram explain density of state, Fermi Dirac distribution and carrier concentration for extrinsic (p type and n type) semiconductors at thermal equilibrium. [4]
  - b) Compare the position of Fermi energy band diagram for p-region and n-region of a p-n junction diode at zero bias, reverse bias and forward bias.
  - c) What do you mean elementary, binary, ternary and quaternary compound in semiconductor materials? Give examples of each. [3]
- *Q3*) Attempt the following.
  - a) Explain the basic operation of MOS capacitor with suitable diagram.[4]
  - b) Explain the concept of minority carrier life time.
  - c) How many atoms are found inside a unit cell of SC, BCC and FCC crystal? How far apart in terms of lattice constant 'a' are the nearest neighbour atom in each case, measured from center to center. [3]

[3]

- *Q4*) Attempt the following.
  - a) Write short notes on Epitaxial growth techniques. (any two) [4]
  - b) Two possible conduction bands are shown in the E-K diagram given in following figure. [3]



Fig. conduction bands for (Q4b)

State which band will result in the heavier electron effective mass. State why?

- c) Discuss qualitatively the  $I_D V_D$  curve for variation of a negative gate bias for JFET ( $V_{DS}$  = constant). Explain pinch-off variation for different negative gate bias voltage. [3]
- **Q5**) Attempt the following.
  - a) What is schrodinger time independent wave equation? Show that the energies of a particle in a one dimensional potential well of infinite height are quantized. [5]
  - b) What is Hall effect? Derive the relation for Hall coefficient? Give it's applications. [5]
- *Q6*) Attempt the following.
  - a) How p-n junction is formed? Explain reverse breakdown region in p-n junction diode. [5]
  - b) Explain the formation of allowed and forbidden energy bands in solids, with proper energy level diagram. [5]

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**SEAT No. :** 

**P1241** 

## [5438]-301

#### M.Sc.

## **ELECTRONIC SCIENCE EL3UT09 : Communication Electronics** (2013 Pattern) (Credit System) (Semester - III)

*Time : 3 Hours ]* 

[*Max. Marks* : 50

Instructions to the candidates:

- Answer any five questions. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.

<b>Q1</b> )	a)	Draw block diagram of communication system and explain each bl in brief.	ock [4]
	b)	With reference to an Antenna explain following terms in brief :	[3]
		i) Directivity.	
		ii) Bandwidth.	
		iii) Radiation Pattern.	
	c)	Explain IrDA module and write its specifications.	[3]
Q2)	a)	Draw and explain block diagram of superheterodyne receiver.	[4]
	b)	Draw diagram of Cassegrain fed parabolied antenna and explain working.	its [3]
	c)	What is CDMA? State features of CDMA technique.	[3]
Q3)	a)	Explain need of XMODEM protocol. Describe fields of the XMOD frame.	EM [4]
	b)	In AM transmitter carrier power is of 500 Watts and modulation is 70 Calculate power in each sideband. Also calculate the total power.	0%. [ <b>3</b> ]

Draw a block diagram of Frequency Hopped Spread Spectrum (FHSS) c) transmitter. [3]

[Total No. of Pages : 2

Q4)	a) b)	<ul> <li>State SDLC frame format and explain SDLC flag field.</li> <li>Explain in brief : <ul> <li>i) Signal to Noise ratio.</li> <li>ii) Noise figure.</li> </ul> </li> </ul>	[4] [3]
	c)	Explain frequency Reuse concept in cellular phone system.	[3]
Q5)	a)	Describe the Yagi-Uda antenna. Write it's features.	[4]
	b)	What is the need of modulation?	[3]
	c)	State Shannon's fundamental theorem of an information theory. Calculate the capacity of standard 4 kHz telephone signal channel with 32 dB S ratio.	ate 5/N [3]
<b>Q6</b> )	a)	With the help of neat diagram, describe construction and working microstrip patch antenna.	of [ <b>4</b> ]
	b)	Explain the terms :	[3]
		i) Equipment Noise.	
		ii) Atmospheric Noise.	
	c)	Explain working of Pulse Amplitude Modulator in brief.	[3]
Q7)	a)	What is ISDN? Write features of ISDN services.	[4]
	b)	Draw block diagram of FDM multiplexer and explain in brief.	[3]
	c)	Draw diagram of an antenna $\pi$ -coupler and state its advantages.	[3]
Q8)	a)	Write advantages, disadvantages and applications of 3G wirele technology.	ess [ <b>4</b> ]
	b)	Describe working of 8QAM in brief.	[3]
	c)	Explain the ground effect of horizontal electric dipole antenna.	[3]

**SEAT No. :** 

## P1242

#### [5438]-401

## M. Sc.-II

## **ELECTRONIC SCIENCE**

#### **EL4UT 10 : Control Systems**

(2013 Pattern) (Semester - IV) (Credit System)

#### Time : 3 Hours]

[Max. Marks: 50

[Total No. of Pages : 2

Instructions to the candidates:

- Answer any five questions. 1)
- All questions carry equal marks. 2)
- 3) Neat diagrams must be drawn wherever necessary.
- Figures to the right side indicate full marks. 4)
- Use of non-programmable calculator is allowed. 5)

## *Q1*) Answer the following :

- Distinguish with suitable example, between the open loop and closed a) loop control system. [4]
- Explain the following terms: b) [3] i)
  - Stable system Conditionally stable system ii)
  - iii) Unstable system
- Sketch the outputs of P, PI and PID controller for a step input signal.[3] c)

## **Q2)** Answer the following :

a)	Explain the working principle of servomotor.	[4]
1-)	Define the configuration Frontain its fortunes and a decenter of	[2]

- Define transfer function. Explain its features and advantages. b) 3
- What is offset error? How it can be reduced. [3] c)

## **Q3)** Answer the following :

- Using Routh's method, check the stability of given characteristic equation.[4] a)  $S^{6} + 2S^{5} + 8S^{4} + 12S^{3} + 20S^{2} + 16S + 16 = 0$
- Explain principle and characteristics of control valves. b) [3]
- Write short note on adaptive control. [3] c)

## **Q4)** Answer the following :

- Explain the working of ON-OFF controller. What is meant by differential a) gap? Why it is necessary. [4]
- Explain Nyquist stability criteria to determine stability of control system.[3] **b**)
- Write a short note on solenoid. c)

*P.T.O.* 

[3]

- **Q5)** Answer the following :
  - a) Define the term root locus. Explain essential conditions that every point on root locus should satisfy. [4]
  - b) What is Bode plot? Explain the procedure for Bode plot. [3]
  - c) What is the role of different types of modeling in control systems? [3]
- *Q6*) Answer the following :
  - a) Find the transfer function of following network. [4]



- b) Explain proportional control mode. What is offset error? [3]
- c) Comment : 'Derivative mode cannot be used alone'. [3]
- *Q7*) Answer the following :
  - a) Derive the transfer function of simple closed loop system in simple or canonical form. [5]
  - b) Write a short note on standard Graphic symbols for process control and instrumentation. [5]
- **Q8)** Answer the following :
  - a) For a proportional controller, the controlled variable is a process temperature with a range of 50 to 130°C and a set point of 73-5°C. Under nominal conditions, the set point is maintained with an output of 50%. Find the proportional offset resulting from load change that requires a 55% output if the proportional gain is [5]
    - i) 0.1 ii) 0.7
    - iii) 2.0 iv) 5.0
  - b) Explain control system for paper tension control system application.[5]

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