

Total No. of Questions :8]

SEAT No. :

P2215

[Total No. of Pages :5

[5331] - 101

M.Sc. - I (Electronic Science)

**EL1UTO1 : MATHEMATICAL METHODS IN ELECTRONICS
AND NETWORK ANALYSIS**

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

Time : 3 Hours]

[Max. Marks :50

Instructions to the candidates:

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

Q1) Attempt the following:

a) Decide the degree and order of the differential equation. **[4]**

i)
$$\frac{d^2 y}{dx^2} + \sqrt{\frac{dy}{dx}} + y = 0.$$

ii)
$$\frac{d^2 y}{dx^2} + \sqrt[3]{\left(\frac{dy}{dx}\right)^2} + y^2 = 0.$$

b) State different types of mathematical models. Explain any one with suitable example. **[3]**

c) Find Laplace Transform of **[3]**

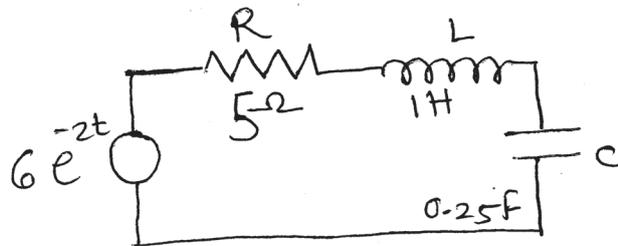
i) $4e^{2t} + 5e^{-3t}.$

ii) $\cos 3t.$

P.T.O.

Q2) Attempt the following:

- a) Determine the co-ordinates of the point $p(2, 3, 5)$, which is in cartesian co-ordinate system, in spherical as well as cylindrical co-ordinate system. [4]
- b) Find $i(t)$, assume initial current through inductor $I_L(0)=0$ and $V_C(0)=0$. [3]

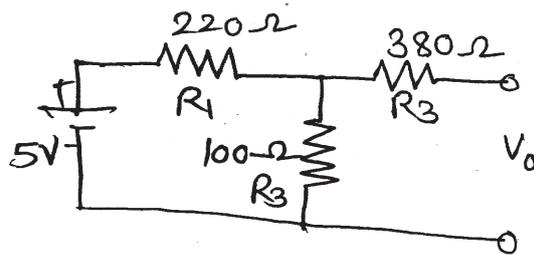


$$R = 5\Omega$$

$$L = 1H$$

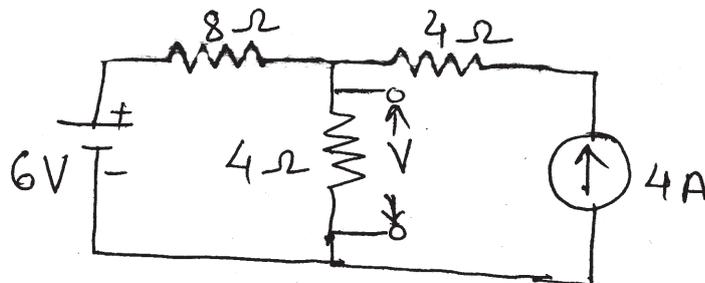
$$C = 0.25F$$

- c) State Thevenin's theorem and find V_{TH} and R_{TH} for the following circuit. [3]



Q3) Attempt the following:

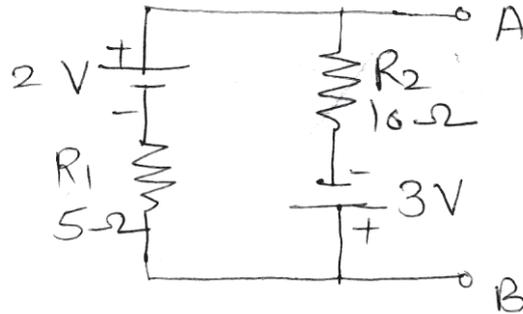
- a) If $F(z) = \frac{2z^2 + z}{z^2 - 1.5z + 0.5}$, Find inverse z-transform $f(k)$. [4]
- b) State super position theorem and use it to solve the following for V. [3]



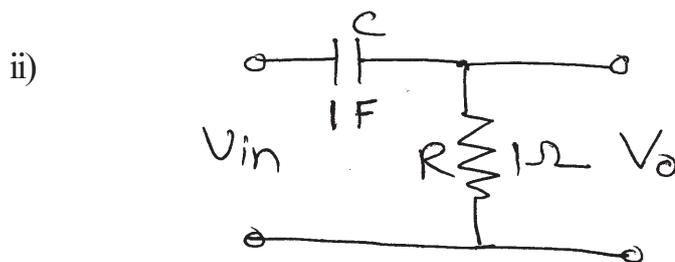
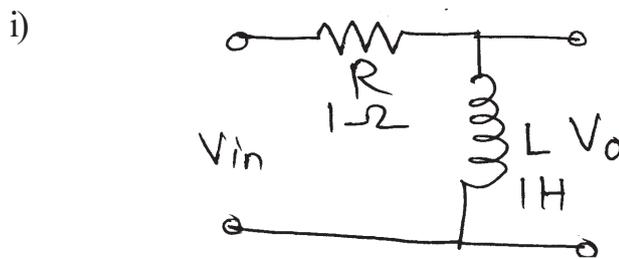
- c) What is Bessel differential equation? List its applications. [3]

Q4) Attempt the following:

- a) State Maximum Power Theorem for AC circuits. What is the maximum power available from the network below? [4]



- b) What is transfer function? Find the transfer function of following circuits. [3]



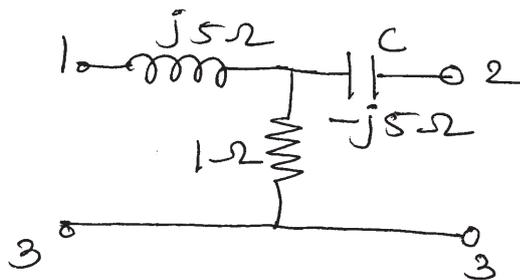
- c) What is ordinary differential equation? State any three differential equations. [3]

Q5) Attempt the following:

- Write the transformation equations for cartesian co-ordinates and spherical polar co-ordinates. [4]
- State final value and initial value theorem. Determine initial value of $F(s) = \frac{6}{s(s+1)}$. Verify using Laplace transform. [3]
- What is meant by state variable? State advantages of state variable method over transfer function method in mathematical modeling system. [3]

Q6) Attempt the following:

- What do you mean by π to T and T to π conversion of networks? Find π form of T network of the following circuit. [4]



- Define stability of a system and determine stability of the system $Q(s) = 3s^3 + 2s^2 + 2s + 12$. [3]
- Solve $\frac{d^2V}{dt^2} + 5\frac{dV}{dt} + 6V = 10e^{-t}u(t)$ Given that $u(0) = 2$ and $\frac{dV(0)}{dt} = 4$. [3]

Q7) Attempt the following:

- What do you mean by mathematical modeling of a system? Derive the mathematical models of series as well as parallel LCR circuits. [5]
- Write down the Laplace's equation in spherical polar co-ordinate system and separate the variables in it to obtain three ordinary differential equations. [5]

Q8) Attempt the following:

- a) Define convolution. **[5]**

Solve the following

$$F(s) = \frac{s^2}{(s^2 + a^2)^2}.$$

- b) Define node, mesh, supermesh, tree and loop. **[5]**



Total No. of Questions : 8]

SEAT No. :

P2216

[5331]-102

[Total No. of Pages : 3

M.Sc. - I

ELECTRONIC SCIENCE

EL1 UT 02: Analogue Circuit Design

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

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

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

Q1) Attempt the following.

- a) With the help of circuit diagram, explain depletion and enhancement mode of operation in MOSFET. [4]
- b) What is the effect of temperature on diode characteristics? [3]
- c) Distinguish between Butter worth and Chebyshev filter approximation techniques. [3]

Q2) Attempt the following.

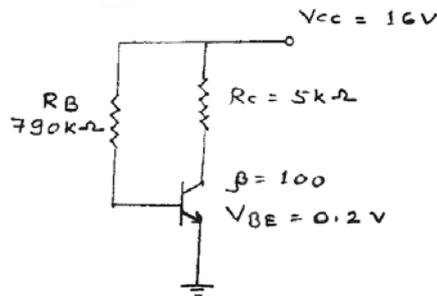
- a) Draw the circuit diagram of a wein Bridge oscillator using BJTs, design it for frequency 10KHz. [4]
- b) Determine the h-parameters for CE configuration. [3]
- c) The common - base d.c. current gain of a transistor is 0.967. If the emitter current is 10mA, what is the value of base current? [3]

Q3) Attempt the following.

- a) Draw the circuit diagram of an active low pass filter. Design it for cut - off frequency 2KHz and pass band gain of 1.56. [4]

P.T.O.

- b) A germanium transistor having $\beta = 100$ and $V_{BE} = 0.2 \text{ V}$ is used in a fixed bias amplifier circuit where $V_{CC} = 16\text{V}$, $R_C = 5\text{k}\Omega$ and $R_B = 790 \text{ k}\Omega$. Determine its operating point. [3]



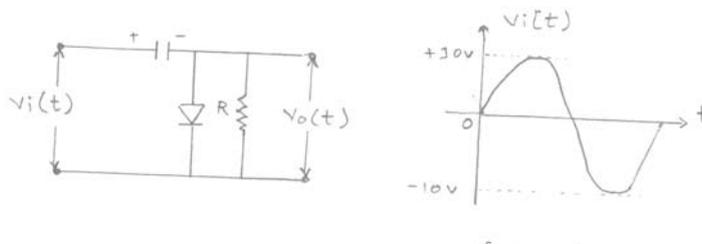
- c) Describe the different coupling schemes used in BJT amplifier. [3]

Q4) Attempt the following:

- With the circuit diagram, explain operation of colpitt's oscillator. Write expression for frequency of oscillations of it. [4]
- Determine the voltage at which the reverse current in a germanium PN junction diode attains a value of 80% of it's saturation value at room temperature. [3]
- State the characteristics of single stage CE, CB and CC amplifier. [3]

Q5) Attempt the following:

- A circuit has a coil of inductance $120\mu\text{H}$ and resistance of 15.7Ω , which is connected in series with a capacitor of 211 pf . Determine resonant frequency and voltage drop across R, L & C at resonance. Assume that the impressed voltage is 0.157v . [4]
- Identify the circuit given below. Determine $V_o(t)$ for circuit for the given sinusoidal input signal and draw output wave form. [3]



- c) Derive the expression of Q - factor for RL resonant circuit. [3]

Q6) Attempt the following.

- a) Obtain expression for input impedance and output impedance with negative feedback for non - inverting amplifier. **[4]**
- b) A CE amplifier has the h - parameters given by $h_{ie} = 1000\Omega$ $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 50$, and $h_{oe} = 25\mu \text{ mho}$. If both the load and source resistances are $1k\Omega$, determine the current gain and voltage gain. **[3]**
- c) Explain miller effect in transistor amplifier. **[3]**

Q7) Attempt the following.

- a) Draw circuit diagram of practical differentiator. Design it to differentiate an input signal that varies in frequency from 10Hz to 1KHz. **[5]**
- b) Define trans conductance (g_m), drain resistance (r_d) and amplification factor (μ) of JFET. Obtain relation between them. **[5]**

Q8) Attempt the following.

- a) With the circuit diagram, obtain expression for output voltage of three op-amp instrumentation amplifier. **[5]**
- b) A crystal has $L = 0.5H$, $C_s = 0.06 \text{ pf}$, $C_p = 1 \text{ pf}$ and $R = 5k\Omega$. Find the series and parallel resonant frequencies and Q - factor of the crystal. **[5]**



Total No. of Questions : 8]

SEAT No :

P2217

[Total No. of Pages :3

[5331]-103

M.Sc. - I

ELECTRONIC SCIENCE

EL1UT03 :Digital System Design

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

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer any five questions.
- 2) All questions carry equal marks.
- 3) Use of log table and non-programmable calculator is allowed.

Q1) Answer the following questions :

- a) State the importance of HDL for digital system design & explain the typical design flow for designing digital circuit using HDL. [4]
- b) Design a BCD to excess-3 code converter circuit. [3]
- c) Derive the equation for d-segment of a common cathode seven segment display using k-map. [3]

Q2) Answer the following questions:

- a) Design a mod-8 synchronous, up counter using D-flip flops. [4]
- b) State the advantages of PLD's over fixed function IC's ? Implement the following using a PLA. [3]

$$Y_1 = x_1 x_2 + \bar{x}_1 \bar{x}_2 \bar{x}_3 \bar{x}_4$$

$$Y_2 = x_1 \bar{x}_3 + \bar{x}_1 x_3 x_4 + x_2$$

$$Y_3 = x_1 x_2 + x_1 \bar{x}_3 + \bar{x}_1 \bar{x}_2 \bar{x}_4$$

- c) Draw the logic diagram for Decimal to BCD encoder. Also write a verilog code to implement it using behavioural modelling. [3]

P.T.O.

Q3) Answer the following questions :

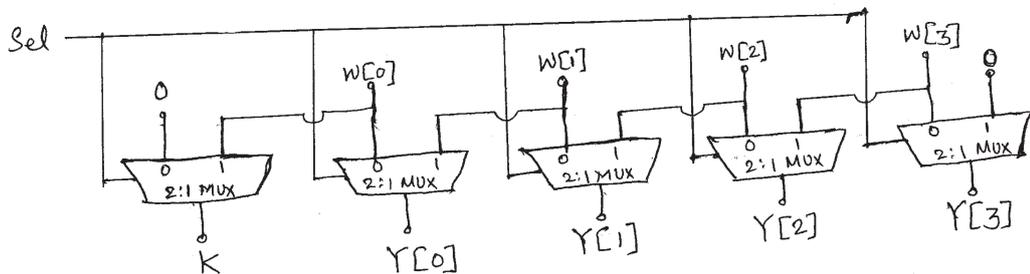
- With the help of a truth table & logic equations design a combinational circuit that will multiply two two-bit binary values $A_1 A_0$ & $B_1 B_0$ respectively, producing 4 bit output $P_3 P_2 P_1 P_0$. [4]
- Explain 4 bit Johnson counter with the help of a neat circuit diagram & timing diagram. [3]
- Draw the symbols & state the truth table for the following gates. [3]
 - bufif1
 - notif0
 Design a 2-to-1 multiplexer using conditional operator.

Q4) Answer the following questions :

- State and explain different types of Read only memories. [4]
- Draw the logic diagram for 3-to-8 decoder using two 2-to-4 decoders. Write a verilog code for a 3-to-8 decoder. [3]
- Draw the state table & excitation table for
 - D-flip flop
 - T-flip flop
 - J-k flip flop
 [3]

Q5) Answer the following questions :

- Write verilog code for the following circuit. [4]



- Explain with examples system tasks & compiler directives in verilog. [3]
- Draw a three bit asynchronous down counter using T-flip flops. Also draw a neat timing diagram of its output. [3]

Q6) Answer the following questions :

- State the difference between blocking & non-blocking assignment in verilog. Write a verilog code for 4-bit Serial In Serial Out (SISO) shift register. [4]
- Implement a one digit BCD adder using 4-bit parallel adder IC. [3]
- Compare static RAM & dynamic RAM. [3]

Q7) Answer the following questions :

- a) Compare tasks & functions in verilog. Write a verilog function for 4-to-1 mux. Write a verilog code for 16-to-1 mux that calls the above function. **[5]**
- b) State the difference between Mealy & Moore state machine. Design a stepper motor sequence generator along with direction control input using FSM model in verilog. **[5]**

Q8) Answer the following questions :

- a) Write a verilog code to add 4-bit binary numbers $x_3x_2x_1x_0$ & $y_3y_2y_1y_0$ using structural modelling. **[5]**
- b) With the help of a neat diagram explain architecture of CPLD and a typical macrocell of CPLD. **[5]**

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Total No. of Questions : 6]

SEAT No. :

P2218

[5331]-104

[Total No. of Pages : 2

M.Sc. - I

ELECTRONIC SCIENCE

**EL1UT04 : Advanced 'C' Programming
(2013 Pattern) (Semester - I) (Credit System)**

Time : 2½ Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) Attempt any four of the following questions.*
- 2) All questions carry equal marks.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following :

- a) Explain the significance of data types in C language. **[4]**
- b) Explain the difference between prefix and post fix decrement operators with suitable example. **[3]**
- c) Write a C program to generate first 50 prime numbers. **[3]**

Q2) Answer the following :

- a) State the types of graphics modes in C. What are the graphics drivers used to set resolution of the video? **[4]**
- b) Explain the concept of recursion in C language with suitable example. **[3]**
- c) Write a program to print sum of Fibonacci series upto fifth term. **[3]**

Q3) Answer the following :

- a) Explain with suitable example 'polymorphism' and 'Inheritance'. **[4]**
- b) C++ is an extension version of C language - Comment. **[3]**
- c) Write a program to accept a decimal number and convert it into binary number. **[3]**

P.T.O.

Q4) Answer the following :

- a) Draw an electronic symbol for N-MOSFET using C-functions. [4]
- b) What is a file? Explain the purpose of a file. [3]
- c) Explain with example the functions available in C-language for handling the parallel port. [3]

Q5) Answer the following :

- a) Explain the concept of dynamic storage allocation in C. Explain the syntax of malloc () and Calloc () operators. [5]
- b) Write a program to display a rectangle along with two diagonals. [5]

Q6) Answer the following :

- a) State any five differences between C and C++. [5]
- b) Write a program to reverse a string using pointers. [5]



Total No. of Questions :8]

SEAT No. :

P2219

[5331]-201

[Total No. of Pages : 3

M.Sc.-I (Electronic Science)

EL2UT05 : APPLIED ELECTROMAGNETICS, MICROWAVES
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) What are the important features of a horn antenna? Explain its construction with necessary diagrams. Why is it called supergain antenna? [4]
- b) Write a short note on 'slot antenna'. [3]
- c) What is Gunn effect? Draw the schematic diagram of n-type GaAs diode and explain the Gunn effect. [3]

Q2) Answer the following questions :

- a) A cubical cavity resonator made of copper ($\sigma = 5.8 \times 10^7$ S/m) is to be operated at 15 GHz. Find the dimensions of the cavity if it is operated in dominant mode. [4]
- b) Find the cut-off frequency for the TE_{10} mode in a rectangular metal wave guide of dimensions $2\text{cm} \times 1\text{cm}$. [3]
- c) Explain the terms $TE_{m,n}$ and $TM_{m,n}$ for a rectangular waveguide. [3]

Q3) Answer the following questions :

- a) A loss-less line has inductance per unit length of $1.65\mu\text{H/m}$ and capacitance per unit length of 13pF/m . Find the velocity of electromagnetic wave travelling along the transmission line. [4]
- b) What is Smith Chart used for? What are its important characteristics? (any four). [3]
- c) Explain 'single stub matching' with the necessary diagram. [3]

P.T.O.

Q4) Answer the following questions :

- a) State Maxwell's equations in frequency domain. Show that $\nabla^2 \bar{E} = \gamma^2 \bar{E}$, where $\gamma^2 = j\omega\mu(\sigma + j\omega\epsilon)$, in case of sinusoidal time-varying EM field. [4]
- b) From Maxwell's equations obtain the expression for power flow in a medium. [3]
- c) Explain what is 'skin effect'. Submarine communication is not possible with EM waves. Explain. [3]

Q5) Answer the following questions :

- a) With a neat diagram explain the working of a magnetron. [4]
- b) How can an antenna be used to measure distant temperatures. [3]
- c) What are waveguide components? List the different waveguide components. [3]

Q6) Answer the following questions :

- a) Estimate the group velocity of EM wave travelling in a rectangular waveguide of dimensions $4\text{cm} \times 2.5\text{cm}$, with a frequency of 5 GHz. [4]
- b) Given that $-\frac{\partial v}{\partial z} = Ri + L \frac{\partial i}{\partial t}$ and $-\frac{\partial i}{\partial z} = Gv + C \frac{\partial v}{\partial t}$ for a transmission line, obtain the transmission line equation in phasor form of frequency domain. [3]
- c) State the different types of transmission lines. Explain the characteristic features of any one of them. [3]

Q7) Answer the following questions :

- a) Obtain the boundary conditions for EM waves at the interface between two dielectric mediums. [5]
- b) A lossy dielectric has a wave impedance of $80\sqrt{50} \Omega$ at frequency ω . The magnetic field component of the wave propagating through the dielectric is given by $\bar{H} = 15e^{-\alpha x} \cos\left(\omega t - \frac{x}{2}\right) \hat{y} \text{ A/m}$. Find \bar{E} and α . [5]

Q8) Answer the following questions :

- a) A transmission line has characteristic impedance of $80 + j 0.02\Omega$ and is terminated in a load impedance of $60 + j 80 \Omega$. Find the reflection coefficient and transmission coefficient. [5]
- b) A transmission line is terminated in an impedance Z_l and the incident voltage and current waves travelling along the transmission line are given by [5]

$$V = V_+ e^{-\gamma z} + V_- e^{\gamma z}$$

$$I = I_+ e^{-\gamma z} + I_- e^{\gamma z}$$

Obtain the expression for reflection coefficient in terms of impedances.



Total No. of Questions : 8]

SEAT No. :

P2220

[5331]-202

[Total No. of Pages : 3

M.Sc.

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) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of non - programmable calculator is allowed.

Q1) a) List the pressure sensing Devices.

Two strain gauges attached to the surface of a cylindrical pressure vessel, one in axial and one in circumferential. direction gave the strain of 0.00018 and 0.00072 respectively. Calculate the hoop and longitudinal stress values. The cylinder is of steel having modulus of elasticity of 200 GN/m² and Poisson's ratio of 0.29. [4]

b) Explain the following characteristics parameters of measurement system. [3]

- i) Precision
- ii) Repeatability and
- iii) Hysteresis

c) A parallel circuit having two branches. The current in one branch is $I_1 = 100 \pm 2A$ and in the other branch is $I_2 = 200 \pm 5A$. Determin the value of total current by- [3]

- i) Considering the errors in the currents as limiting errors.
- ii) Considering the errors as standard deviation. Comment on the result.

Q2) a) Explain the loading effect due to series connected instruments. It is desired to measure the value of current in 500Ω resistor as shown in fig.1 by connecting 100Ω ammeter. [4]

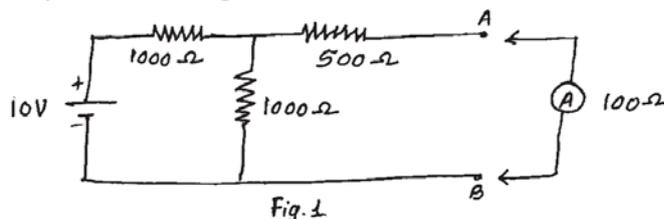


Fig. 1

P.T.O.

Find

- i) The actual value of current
 - ii) Measured value of current and
 - iii) Percentage error in the measurement and accuracy.
- b) What is transducer? Give the advantages of electrical/electronic transducers. List the transducers used for temperature measurement. [3]
- c) List the characteristics of transducer that are considered while choosing a transducer for the measurement of physical parameter. What is transfer characteristic of transducer. [3]
- Q3)** a) What is strain gauge? List the different types of strain gauges. State advantages and applications of strain gauges. [4]
- b) Write working principle of capacitive transducer. Compute the capacitance of parallel plate capacitive transducer having area of plate is 500 mm^2 and separation distance is 200 mm . The transducer used in air with permittivity is $8.85 \times 10^{-12} \text{ F/m}$. Calculate the change in capacitance if the distance between the plates is reduced to 180 mm by displacement also, calculate the sensitivity. [3]
- c) Describe working principle of [3]
- i) Thermocouple and
 - ii) Radiation pyrometer
- Q4)** a) List the displacement transducers. Describe LVDT transducer used for displacement measurement. State advantages and limitations of it. [4]
- b) Compare the following measurement systems. [3]
- i) Deflection and null type
 - ii) Direct and indirect measurement
- c) State the different methods of flow measurement. Describe the working principle of ultrasonic flow meter. [3]

- Q5)** a) Describe piezoelectric transducer and its different modes of operations. Give advantages and applications of it. [4]
- b) An LVDT is used in an accelerometer to measure seismic mass displacement. The spring constant is 240 N/M and core mass is 0.05kg. The LVDT and signal conditioning output is 0.31 mV/mm with ± 20 mm core displacement. [3]
Find
- i) Relation between acceleration in m/s^2 and the output voltage.
- ii) Natural frequency and maximum acceleration measurable.
- c) A temperature sensing devices can be modified as a first order system with time constant of 6 sec. It is suddenly subjected to a step input of 25°C to 150°C , what temperature will it be indicated in 10 sec after the process has started? [3]
- Q6)** a) Explain zero order system with suitable example. [4]
- b) A platinum resistance thermometer has a resistance of 100Ω at 25°C . Find the resistance at 65°C temperature and find temperature for 150Ω resistance. The temperature co-efficient is 0.00392°C . [3]
- c) A beam type load cell of width 200 mm and thickness 50 mm is mounted with four strain gauges, which enables measuring a maximum load of 100kN. If the strain gauges are to be mounted at the root of the cantilever, determine the approximate length of the beam.
Determine $(\Delta E_0 / V)_{\max}$ and sensitivity to this load cell. Given: $E = 70$ GPa, $\nu = 0.33$, $\sigma_f = 150$ MPa, $S_g = 2$ and $R_g = 120 \Omega$. [3]
- Q7)** a) Give detail classification of transducers. List the resistive transducer with measured. [5]
- b) State the types of microphones. Define sound pressure level and sound power level. Explain sound level meter. [5]
- Q8)** a) Describe dynamic performance of measurement system. Describe first order electrical system for unit step input. [5]
- b) What is thermistor? Give its different forms of construction. Compare its performance with resistance thermometer. State the salient features of thermistor. [5]



Total No. of Questions : 8]

SEAT No. :

P2221

[5331]-203

[Total No. of Pages : 4

M.Sc. - I

ELECTRONIC SCIENCE

EL2UTO7 : Embedded System Design

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

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Attempt any five questions.*
- 2) *All questions carry equal marks.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*

Q1) Attempt the following :

- a) Draw data memory map of Atmega16 microcontroller. Explain with example addressing modes of Atmega16 microcontroller. **[4]**
- b) Draw interface of two TWS (Thumb Wheel Switches) to PORTB and two common cathode seven segment displays (SSDs) to PORTC and PORTD of PIC18F458 or PIC18F4550. Write C program to read TWS and display it on SSDs. **[3]**
- c) What is embedded system? List the features of embedded system. Give examples of embedded system. **[3]**

Q2) Attempt the following :

- a) Write features of ADC module in Atmega16 microcontroller. Write C program to read data from channel 0 of ADC and displays the result on PORTC and PORTD continuously. **[4]**

ADMUX :

REFS1	REFS0	ADLAR	MUX4	MUX3	MUX2	MUX1	MUX0
-------	-------	-------	------	------	------	------	------

ADCSRA

ADEN	ADSC	ADATE	ADIF	ADIE	ADPS2	ADPS1	ADPS0
------	------	-------	------	------	-------	-------	-------

- b) Explain with block diagram Timer 0 in 8-bit mode of PIC18F458/ PIC18F4550. Write C program to generate 2 KHz square wave on pin PORTB.0 use timer 0, 8-bit mode, no prescale, XTAL=10 mHz **[3]**

P.T.O.

T0CON :

TMR0ON	T08BIT	T0 CS	T0SE	PSA	T0PS2	T0PS1	T0PS0
--------	--------	-------	------	-----	-------	-------	-------

INTCON :

GIE	-	TMR0IE	INT0IE	-	TMR0IF	-	-
-----	---	--------	--------	---	--------	---	---

- c) What is cross compiler? Compare assembly language and C programming for microcontroller. Can we use assembly instructions in C program for microcontroller? [3]

Q3) Attempt the following :

- a) Draw the circuit diagram of Target board for Atmega16. show [4]
- i) USART connection to computer
 - ii) reset and oscillator circuit. Write different clock sources of Atmega16.
- b) i) Identify addressing mode of following instructions of PIC18F458/PIC18F4550 [3]
- 1) MOVWF OX 20
 - 2) MOVWF INDF0
 - 3) ANDLW B'01000000
- ii) Show content of WREG and status of conditional flags after execution of following instructions for PIC18F458/PIC18F4550.
MOVLWOX39
ADDLW OX 58
- c) Explain different methods of programming flash memory in AVR and PIC microcontroller. [3]

Q4) Attempt the following :

- a) Draw interface of Stepper Motor (SM) to PIC18F458 or PIC18F4550. Write C program to rotate stepper motor clockwise for one revolution and then stop-step angle of SM = 1.8° . [4]
- b) Write C program for Atmega16 to toggle LED connected at PORTD bit 0, continuously with delay of 1 sec. Use timer 1, normal mode, no prescaler, Assume XTAL = 8 mHz. [3]

TCCR1A :

COM1A1	COM1A0	COM1B1	COM1B0	FOC1A	FOC1B	WGM11	WGM10
--------	--------	--------	--------	-------	-------	-------	-------

TCCR1B :

ICNC1	ICES1	-	WGM13	WGM12	CS12	CS11	CS10
-------	-------	---	-------	-------	------	------	------

TIFR :

OCF2	T0V2	ICF1	OCF1A	OCF1B	T0V1	OCF0	T0V0
------	------	------	-------	-------	------	------	------

- c) What is zig Bee communication on standard? State its specifications.

[3]

Q5) Attempt the following :

- a) Draw interface of single 5×7 dot matrix LED display to PIC18F458/ PIC18F4550. Write C program to display 'A' continuously. [4]
- b) For Atmega16 microcontroller, find frequency and duty cycle of square wave generated at OC0 pin by following code. Assume xTAL = 8 MHz

i) `int main ()`
`{`
`DDRB = DDRB 1 (1 << 3);`
`OCR0 = 199;`
`TCCR0 = 0 × 19 ;`
`while (1);`
`}`

ii) `int main ()`
`{`
`DDRB = DDRB 1 (1<< 3);`
`OCR0 = 95;`
`TCCR0 = 0 × 6A`
`while (1);`
`}`

TCCR0 :

FOC0	WGM00	COM01	COM00	WGM01	CS02	CS01	CS00
------	-------	-------	-------	-------	------	------	------

 [3]

- c) Write short note on - USB, Bluetooth.

[3]

Q6) Attempt the following :

- a) Draw data memory map of PIC18F458 or PIC18F4550. Write ALP to read data from PORTB, add 3 to it and write result to PORTD. [4]

- b) Draw interface of 2-digit multiplexed display using common cathod SSD to Atmega 16. Write C program to implement 2-digit BCD counter. [3]
- c) Explain with neat diagram frame format of I2C protocol. Draw timing diagram for I2C write operation. [3]

Q7) Attempt the following :

- a) With neat diagram explain PWM operation of CCP module in PIC18F458/ PIC18F4550. Write C program to generate 2.5kHz PWM with 75% duty cycle. Assume XTAL = 10 mHz. [5]

T2CON :

T2UTPS3	T2UTPS2	T2UTPS1	T2UTPS0	TMR2ON	T2CKPS1	T2CKPS0
---------	---------	---------	---------	--------	---------	---------

CCPICON :

-	-	DC1B1	DC1B0	CCP1M3	CCP1M2	CCP1M1	CCP1M0
---	---	-------	-------	--------	--------	--------	--------

- b) Compare : [5]
- Von Neuman and Harvard architecture
 - RISC and CISC architecture

Q8) Attempt the following : [5]

- a) List different interrupts available in Atmega16. A push button is connected to INT0 pin and LED is connected to PORTC bit 0 of Atmega16. Write C program, which toggles LED each time when push button connected to INT0 pin is pressed.

GICR :

INT1	INT0	INT2	-	-	-	IVSEL	IVCE
------	------	------	---	---	---	-------	------

MCUCR :

SE	SM2	SM1	SM0	ISC11	ISC10	ISC01	ISC00
----	-----	-----	-----	-------	-------	-------	-------

- b) Draw interfacing of SPI device to microcontroller. Explain SPI single byte write operation. [5]



Total No. of Questions : 6]

SEAT No. :

P2222

[Total No. of Pages : 2

[5331] - 204

M.Sc. -I

ELECTRONIC SCIENCE

EL 2 UT08: Foundation of Semiconductor Devices

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

Time : 2½ Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following:

- a) Explain Eber-moll model of BJT. [4]
- b) Why the electron generation rate and recombination rate equal in thermal equilibrium? Comment. [3]
- c) Assume that in an n-type GaAs semiconductor at $T = 300\text{K}$, the electron concentration varies linearly from 1×10^{18} to $7 \times 10^{17} \text{ cm}^{-3}$ over a distance of 0.1 cm. Calculate the diffusion current density if the electron diffusion coefficient is $D_n = 225 \text{ cm}^2$. [3]

Q2) Attempt the following:

- a) What is Hall effect? Derive the relation for Hall coefficient. [4]
- b) Define any three performance parameters of JFET. [3]
- c) Calculate the De Broglie wavelength of an electron which has kinetic energy 15eV. [3]

P.T.O.

Q3) Attempt the following:

- a) Explain the working principle of heterojunction bipolar Transistor. [4]
- b) Explain the concept of effective mass of electron. [3]
- c) How p-n junction is formed? What is meant by potential barrier? [3]

Q4) Attempt the following:

- a) Explain the difference between SC, FCC and BCC. [4]
- b) What is meant by complete ionization of donor states and acceptor states? [3]
- c) What is Miller Indices? What are Miller indices of plane making intercepts 2a, 3b and 6c on three axes? [3]

Q5) Attempt the following:

- a) What is Schrodinger equation? Derive time independent schrodinger equation for a free particle. [5]
- b) Draw band diagram and show variation of Fermi distribution function for [5]
 - i) intrinsic
 - ii) n-type
 - iii) p-type semiconductor at thermal equilibrium.

Show that product of electron and hole concentration is given by
 $n_o p_o = n_i^2$.

Q6) Attempt the following:

- a) Explain ideal current voltage relation for n-channel MOSFET for [5]
 - i) enhancement mode
 - ii) depletion mode
- b) Explain the Czochrolski methods for semiconductor crystal growth.[5]

EEE

Total No. of Questions : 8]

SEAT No. :

P2223

[5331]-301

[Total No. of Pages : 2

M.Sc. - II

ELECTRONIC SCIENCE

**EL3UT 09 : Communication Electronics
(2013 Pattern) (Credit System) (Semester - III)**

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

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

- Q1)** a) Write importance of signal to noise ratio and noise figure. [4]
b) With the help of diagram, explain working of antenna direct coupling. [3]
c) Explain principle of light transmission in fibre with the help of neat labelled diagram. [3]
- Q2)** a) Draw neat diagram and explain working of diode detector used for AM signal detection. [4]
b) Describe ground wave propagation of electromagnetic waves. [3]
c) Draw block diagram of cellular radiosystem. [3]
- Q3)** a) With the help of block diagram, explain working of pulse code modulator (PCM) in detail. [4]
b) An Am broadcast station operates at its maximum allowed total output of 50kW and at 95% modulation. How much power is transmitted in sidebands? [3]
c) With the reference of propagation of waves explain the terms: [3]
i) Ionospheric scatter
ii) tropospheric scatter

P.T.O.

- Q4)** a) Draw block diagram of delta modulator and explain its working. [4]
 b) With the help of neat block diagram, explain working of single side band generation using phase shift method. [3]
 c) Explain PSTN with neat block diagram. [3]

- Q5)** a) Describe the log periodic antenna. Write its features. [4]
 b) Compare amplitude modulation and frequency modulation. [3]
 c) Draw block diagram of VSAT communication system. [3]

- Q6)** a) With reference to small dipole antenna, explain the terms. [4]
 i) Power density
 ii) Radiation resistance
 b) Define the following: [3]
 i) Channel capacity
 ii) Band rate
 iii) Band width
 c) Determine % amplitude modulation index for an unmodulated carrier of 80V (P-P) for data given below. [3]

	maximum p - p Carrier (v)	mininum (p - p) Carrier (v)
i)	100	60
ii)	125	35
iii)	160	0

- Q7)** a) Explain working of digital exchange in brief. [4]
 b) With the help of block diagram, explain working of frequency shift keying modulation technique. [3]
 c) Explain switch beam and adaptive array smart antenna systems in brief. [3]

- Q8)** a) With the help of block diagram, explain working of satellite transponder. [4]
 b) Explain the ground effect of horizontal electric dipole antenna. [3]
 c) Explain in brief. [3]
 i) Compounding
 ii) Quantization
 iii) Encoding



Total No. of Questions :8]

SEAT No. :

P2224

[5331]-401

[Total No. of Pages : 3

M.Sc.-II

ELECTRONIC SCIENCE

EL4UT 10 : CONTROL SYSTEMS

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

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) *Use of non-programmable calculator is allowed.*

Q1) Attempt the following :

- a) Explain the concept of feedback control. Describe various elements used in feedback control system. **[4]**
- b) Explain canonical form of block diagram for closed loop system. Derive its transfer function. **[3]**
- c) Explain the terms; integral windup and derivative overrun. **[3]**

Q2) Attempt the following :

- a) Write a short note on recorder. **[4]**
- b) Explain the following terms in short. **[3]**
 - i) Stable system,
 - ii) Critically stable system and
 - iii) Conditionally stable system
- c) Explain the quarter wave amplitude criterion for process pop tuning. **[3]**

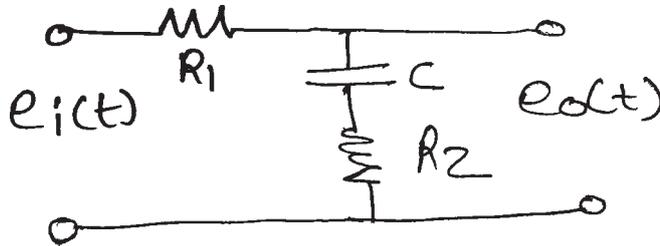
Q3) Attempt the following :

- a) Using Routh-Hurwitz stability criteria, determining the stability of a system having denominator polynomial
 $D(S) = S^5 + S^4 + 3S^3 + 3S^2 + 6S + 4 = 0.$ **[4]**
- b) Write a short note on pneumatic actuators. **[3]**
- c) With the help of neat diagram, explain the feed forward control system. **[3]**

P.T.O.

Q4) Attempt the following :

- a) Compare the performance of PI, PD and PID controllers. [4]
- b) Obtain the transfer function of lag network shown below. [3]



- c) Explain the function of annunciator. [3]

Q5) Attempt the following :

- a) Define the term root locus. Explain the essential conditions that every point on the root locus must satisfy. [4]
- b) What is Bode plot? Explain the procedure to obtain Bode plot. [3]
- c) What is meant by process load and process lag? [3]

Q6) Attempt the following :

- a) Design a two position controller using OPAMP. [4]
- b) What is the role of different types of modeling used in control system. [3]
- c) With suitable example, distinguish between open loop system and closed loop system. [3]

Q7) Attempt the following :

- a) Write a short note on SCADA. [5]
- b) What is meant by Zigler-Nichols method? Explain it for any type of controller. [5]

Q8) Attempt the following :

- a) A PI controller is reverse acting with 12 repeat per minute having proportional band 20. Determine
- i) proportional gain,
 - ii) integral gain, and
 - iii) time that the controller output reach % after a constant error of 1.5% starts, given $P_1(0) = 72\%$. **[5]**
- b) Explain the application of control system for speed control of dc motor. **[5]**

