Total No. of Questions : 8]

SEAT No. : ____

P1233

[Total No. of Pages : 3

[5438]-101

M.Sc.

ELECTRONIC SCIENCE

EL1UT - 01 : Mathematical Methods in Electronics and Network Analysis

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

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

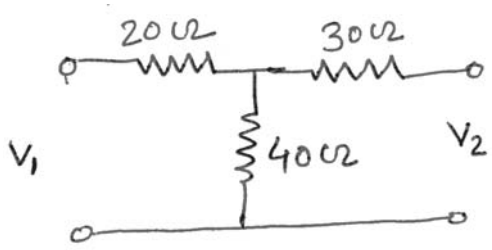
1) ***Attempt any five questions.***
2) ***All questions carry equal marks.***
3) ***Use of non-programmable calculator is allowed.***

Q1) Answer the following:

a) State and explain different type of modelling. Derive the mathematical model for ideal integrator and ideal differentiator circuit using op-amp. **[4]**

b) Determine the unit step response to the series R-L circuit using differential equation. **[3]**

c) Determine the Z parameters for the following Netowrk. **[3]**



Q2) Answer the following:

a) The co-ordinates of a point in cylindrical system are $(r, \theta, z) = (2, -\pi/4, 1)$ 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]**

b) Solve following differential equation using Laplace transform $\frac{d^2v(t)}{dt^2} + 6\frac{dv(t)}{dt} + 8v(t) = 2u(t)$ for subject to $v(0) = 1, v'(0) = -2$. **[3]**

c) Define the terms Mesh, Node and Loop. **[3]**

P.T.O.

Q3) Answer the following:

a) State initial and final value theorem. Find out initial and final value of following function. Verify your answer using $f(t)$. **[4]**

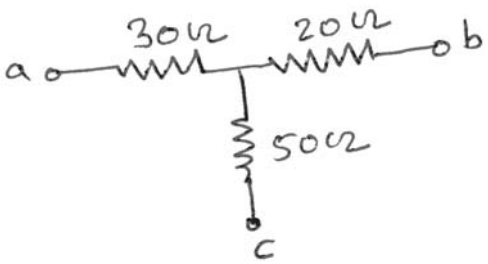
$$f(s) = \frac{5(s+1)}{(s+2)(s+3)}.$$

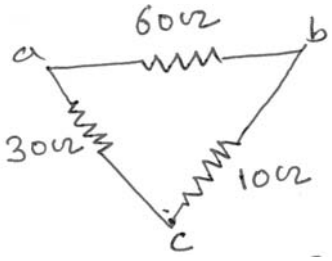
b) State and explain superposition theorem. Explain it's limitation. **[3]**

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

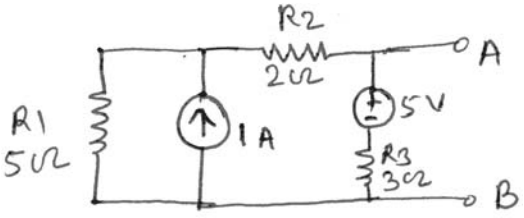
Q5) Answer the following.

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

b) Find Laplace transform of **[3]**

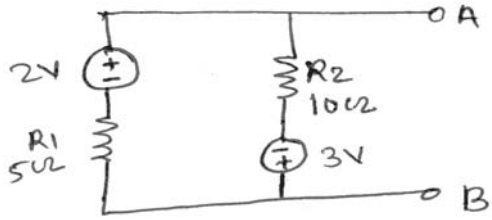
i) $\cosh(at)$ ii) $\sinh(at)$

c) State Norton theorem for dc circuit. Find Norton equivalent circuit for following circuit. **[3]**



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:

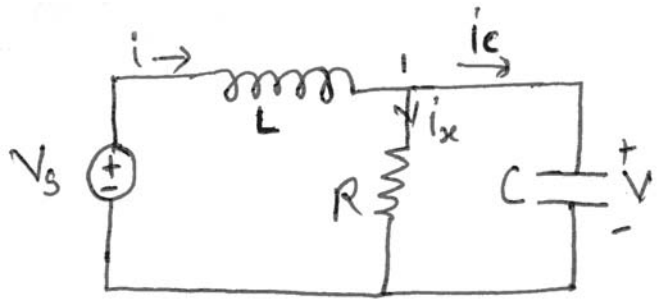
a) What is analogus system? Explain how electrical system can be analogus to translational mechanical system. **[5]**

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 $f(s) = \dfrac{2s}{(s+1)(s^2+4)}$. **[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]**



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Total No. of Questions :8]

SEAT No. : ____

P1234

[Total No. of Pages : 3

[5438]-102
M.Sc. - I
ELECTRONIC SCIENCE
EL1UT02: 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 questions 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) Explain switching characteristics of P-N junction diode. **[4]**

b) Compare MOSFET and JFET. **[3]**

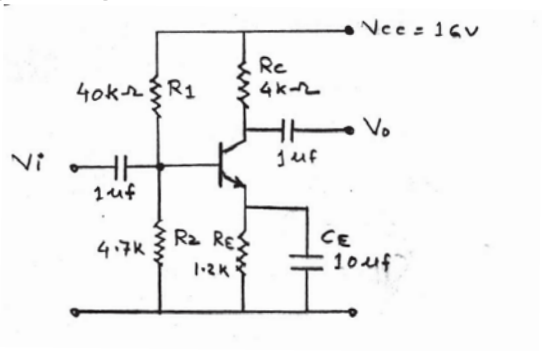
c) Draw circuit diagram of collector- emitter feedback bias. Derive expression for its stability factor 'S'. **[3]**

Q2) Attempt the following:

a) What is clipper? With circuit diagram and waveforms explain the working of positive and negative externally biased series type clipper . **[4]**

b) Explain different types of distortion in amplifier. **[3]**

c) Determine the input impedance, voltage gain and current gain of the CE amplifier given below using h-parameter with h_{ie}=3.2 Ω and h_{fe}=100 at the operating conditions. **[3]**



P.T.O.

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 μH and 12 μH. Find the frequency of oscillations and the feedback factor β. **[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 μH. The resistance of the inductor is 10 Ω. 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]**

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Total No. of Questions : 8]

SEAT No. :

P1235

[Total No. of Pages : 3

[5438]-103

M.Sc. - I

ELECTRONIC SCIENCE

EL1 UT 03 : Digital System Design

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

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 tables/non programmable calculator is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) Attempt the following:

a) Explain design flow for digital system design using verilog HDL. **[4]**

b) Implement the following function using 4 : 1 multiplexer **[3]**

$F(A, B, C)=\Sigma m (1, 3, 5, 6)$

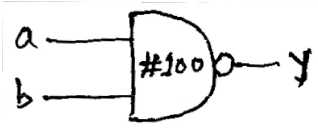
c) Explain with neat diagram architecture of CPLD. **[3]**

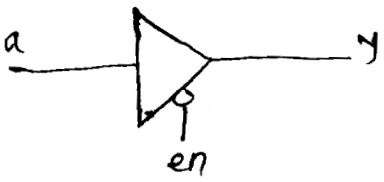
Q2) Attempt the following:

a) Write the verilog code for 4:1 MUX using dataflow and behavioral modeling. **[4]**

b) State the advantages of PLD's over fixed function IC's. List various types of PLD's. **[3]**

c) Write verilog code for **[3]**

i) 

ii) 

Q3) Attempt the following:

a) Draw the truth table with 3-input variables A, B, C and P, Q as output 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.

P.T.O.

b) Implement the following using PAL **[3]**

$F_1 (A, B, C) = \Sigma m (1, 4, 5, 7)$

$F_2 (A, B, C) = \Sigma m (1, 2, 3, 6)$

c) Explain different loop structures used in verilog. **[3]**

Q4) Attempt 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) Attempt the following:

a) Write a verilog code for 4-bit ring counter using behavioral modeling. Write 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) Attempt the following:

a) Write the verilog code for **[4]**

i) 4-bit ALU

ii) 8 to 3 priority encoder

b) If X = 4' b1010 **[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]**

Q7) Attempt the following:

a) Draw and explain architecture of FPGA. List applications of FPGA. **[5]**

b) Write verilog code for traffic light control using FSM. **[5]**

Q8) Attempt the following:

a) Explain with neat diagram SRAM memory cell. Explain 'write' operation 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]**

Total No. of Questions : 6]

SEAT No. :

P1236

[Total No. of Pages : 2

[5438]-104

M. Sc. - I

ELECTRONIC SCIENCE

EL1UT - 04 : Advanced 'C' Programming

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

Time : 3 Hours] *[Max. Marks : 40*

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-program to draw symbol of JFET using graphics commands. **[4]**

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]**

P.T.O.

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]**

Total No. of Questions : 8]

SEAT No. :

P1237

[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 $m\Omega m^{-1}$, L = 1.5 $\mu H m^{-1}$, G = 1.4 μ m^{-1} and C = 1.4 $nF m^{-1}$ 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 × 3.5 cm operator in dominant TE_{10} 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? **[2]**

b) What is a waveguide? What are the waveguide components? **[3]**

c) Write a short note on Yogi Uda antenna. **[3]**

P.T.O.

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 = 5.8×10^7 mho/m] **[3]**

c) What is cavity resonator? Explain Q-factor of cavity resonator. **[3]**

Q6) Answer the following questions :

a) With suitable diagram explain the construction and working of magnetron. **[4]**

b) Explain single stub matching of transmission line with necessary diagram. **[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 α is attenuation constant, μ is permeability, β 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 + j0.01Ω and is terminated in a load impedance of 73 – j42.5Ω. Find the reflection coefficient and the standing wave ratio. **[5]**

b) Write short note on : **[5]**

i) End fire antenna.

ii) Broadband antenna.

Total No. of Questions : 8]

SEAT No. :

P1238

[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 $\frac{1}{10}^{th}$ scale division can be estimated with fair degree of uncertainty. Determine the resolution of the voltmeter. **[4]**

b) A voltmeter having sensitivity of 10 kΩ/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.

P.T.O.

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 25ºC to air at 35ºC, then to water at 70ºC and back to air at 35ºC. 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 = 25ºC Initial temperature,

$0 < t < 7$, T = 35ºC dry probe in air,

$7 < t < 15$, T = 70ºC probe in water and

$15 < t < 30$, T = 35ºC 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 Ω/ºC and a time constant of 5.5 sec experiences a step change of 75ºC. Before the temperature change, it has a stable 100Ω 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^2. Young's modulus of steel is 207 GN/m^2 and the unstrain resistance is of 240Ω with gage factor 2.2. When a load is applied, the gage resistance changes by 0.013Ω. 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 $\frac{1}{5}^{th}$ 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 120Ω and gage factor 2 is mounted at 45º 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 0.1Ω. Find the load torque. **[4]**

b) Give the comparison between resistance thermometer and thermocouple. **[3]**

c) Describe inductive transducers with - **[3]**

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 45º, 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 25ºC. Find its resistance at 65ºC and find temperature for 150Ω resistance. The temperature coefficient of platinum is 0.00392/ºC. **[5]**

b) Describe working principle of radiation pyrometers. State their types, specification and advantages. **[5]**

Total No. of Questions : 8]

SEAT No. :

P1239

[Total No. of Pages : 4

[5438]-203
M.Sc. - I
ELECTRONIC SCIENCE
EL2UT07 : Embedded System Design
(2013 Pattern) (Credit System) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

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	O	BRGH	TRMT	TX9D

D7 D0

TXSTA : Transmit status & control register.

-	-	RCIF	TXIF	-	-	-	-

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

TCCR1B

ICNC1	ICES1	-	WGM13	WGM12	CS12	CS11	CS10

TIFR

OCF2	TOV2	ICF1	OCF1A	OCF1B	TOV1	OCF0	TOV0

b) Describe the PIC18F458 or PIC18F4550 microcontroller status register in short.

Find the C, Z & DC flags for each of the following

i) MOVLW 0×3F
ADDLW 0×45

ii) MOVLW 0×99
ADDLW 0×58

iii) MOVLW 0×F5
ADDLW 0×0B **[3]**

c) Write a note on SPI protocol. **[3]**

Q4) Answer the following :

a) Write the output of each instruction in the following code and state the purpose of the code. **[4]**

```
MYNUM   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]**

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 :

REFS1	REFS0	ADLAR	MUX4	MUX3	MUX2	MUX1	MUX0

ADCSRA

ADEN	ADSC	ADATE	ADIF	ADIE	ADPS2	ADPS1	ADPS0

TCCRO

FOC0	WGMO0	COMO1	COMO0	WGMO1	CSO2	CSO1	COSO0

b) i) What are the criteria the designer should consider in choosing a microcontroller for embedded system development. **[3]**

ii) Explain in short development cycle of embedded system. **[2]**

Q8) Answer the following :

a) Draw a block diagram of a car parking controller using PIC18F458/ 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) Zigbee.

ii) Bluetooth.

Total No. of Questions : 6]

SEAT No. : ____

P1240

[Total No. of Pages : 2

[5438]-204
M.Sc. - I
ELECTRONIC SCIENCE
EL2UT 08 : Foundation of Semiconductor Devices
(2013 Pattern) (Semester - II) (Credit System)

Time : 2½ Hours] ***[Max. Marks : 40***

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 $10^{16}cm^{-3}$ 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 = 1.5×10^{10} cm^{-3}) **[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. **[3]**

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. **[3]**

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]**

P.T.O.

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]**

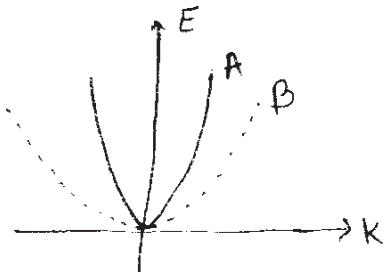


Fig. conduction bands for (Q4b)

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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Total No. of Questions : 8]

SEAT No. :

P1241

[Total No. of Pages : 2

[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:

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

Q1) a) Draw block diagram of communication system and explain each block in brief. **[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 its working. **[3]**

c) What is CDMA? State features of CDMA technique. **[3]**

Q3) a) Explain need of XMODEM protocol. Describe fields of the XMODEM frame. **[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. **[3]**

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

P.T.O.

Q4) a) State SDLC frame format and explain SDLC flag field. **[4]**

b) Explain in brief : **[3]**

i) Signal to Noise ratio.

ii) Noise figure.

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/N ratio. **[3]**

Q6) a) With the help of neat diagram, describe construction and working of microstrip patch antenna. **[4]**

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 π-coupler and state its advantages. **[3]**

Q8) a) Write advantages, disadvantages and applications of 3G wireless technology. **[4]**

b) Describe working of 8QAM in brief. **[3]**

c) Explain the ground effect of horizontal electric dipole antenna. **[3]**

Total No. of Questions : 8]

SEAT No. :

P1242

[Total No. of Pages : 2

[5438]-401
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) ***Figures to the right side indicate full marks.***
5) ***Use of non-programmable calculator is allowed.***

Q1) Answer the following :

a) Distinguish with suitable example, between the open loop and closed loop control system. **[4]**

b) Explain the following terms : **[3]**

i) Stable system ii) Conditionally stable system

iii) Unstable system

c) Sketch the outputs of P, PI and PID controller for a step input signal. **[3]**

Q2) Answer the following :

a) Explain the working principle of servomotor. **[4]**

b) Define transfer function. Explain its features and advantages. **[3]**

c) What is offset error? How it can be reduced. **[3]**

Q3) Answer the following :

a) Using Routh's method, check the stability of given characteristic equation. **[4]**

$S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$

b) Explain principle and characteristics of control valves. **[3]**

c) Write short note on adaptive control. **[3]**

Q4) Answer the following :

a) Explain the working of ON-OFF controller. What is meant by differential gap? Why it is necessary. **[4]**

b) Explain Nyquist stability criteria to determine stability of control system. **[3]**

c) Write a short note on solenoid. **[3]**

P.T.O.

Q5) Answer the following :

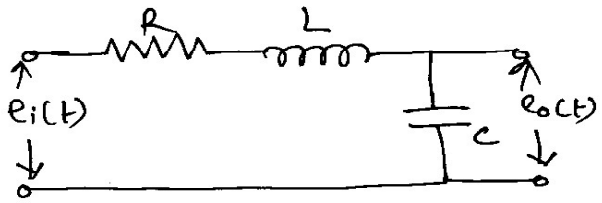
a) Define the term root locus. Explain essential conditions that every point on root locus should satisfy. **[4]**

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]**