Total No. of Questions : 7]

SEAT No. : ____

PC-3934

[Total No. of Pages : 3

[6344]-101
M.Sc. - I
ELECTRONIC SCIENCE
ELUT - 111 : Mathematical Methods in Electronics Using C (2019 Pattern) (Semester - I)(Credit System)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Q. 1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Question no. Q.2 to Q.7 carry equal marks.***

Q1) Attempt any five of the following : **[10]**

a) Compare structure and union in C.

b) Mention the classification of signals in time domain.

c) Write any four properties of unilateral laplace Transform.

d) What is the transient state response of the system?

e) Decide the degree and order of DE given by

$$\frac{d^4y}{dx^4} - \sin\frac{d^3y}{dx^3} = 0$$

f) Find the Laplace transform of e^{-2t} Cos2t u(t)

Q2) Attempt the following :

a) i) Determine the stability of polynomial D(S): **[4]**

$$D(s) = 2S^5 + 3S^4 + 2S^3 + S^2 + 2S + 2$$

ii) Draw poles and zero for H(s) is given by **[3]**

$$H(s) = \frac{(S-1)(S+5)}{S(S+1)(S+1-j^2)(S+1+j^2)}$$

b) What is Laplace transform? Find the inverse laplace transform of $F(s) = \frac{2}{S^3 + 3S + 2}$ using partial fraction method. **[5]**

P.T.O.

Q3) Attempt the following :

a) i) The co-ordinate of point p (2,3,5) is in Cartesian co-ordinate system convert it into sperical and cylindrical. **[4]**

ii) Explain the meaning of two part network. Define impedance and admittance of function. **[3]**

b) What is pointer? Write a program in 'C' to reverse a string using pointer. **[5]**

Q4) Attempt the following :

a) i) What is meant by partial differential equation? Give the example of PDE. **[4]**

ii) Define Z-transform. Find Z-transform of **[3]**

i) Unit impulse

ii) Unit step function

b) Write Bessel differential equation. List application of Bessel equation in electronics. **[5]**

Q5) Attempt the following :

a) i) Explain with example the difference between declaration and definition of a function in C language. **[4]**

ii) State final value theorem. Determine the final value of **[3]**

$$F(s) = \frac{5(S+1)}{(S+2)(S+3)}$$

b) What do you mean by recurisve function. Write a C-program to find factorial of 5 using recursive function. **[5]**

Q6) Attempt the following :

a) i) Define transfer function. Find transfer function of passive RC high pass filter. **[4]**

ii) Define inverse Z transform of X(y) **[3]**

$$x(y) = \frac{1}{1-1.5Z^{-1}+0.5Z^{-2}}$$ for ROC is |z|>1.

b) What do you meant by state variable? Write the necessity of it. Write the advantages of state variable method over the other methods. **[5]**

Q7) Attempt any two of the following.

a) Write a short note on periodic and non-periodic signals. **[6]**

b) Explain operators and precedence rule in C. **[6]**

c) Write a short note on linearity and time shifting property of Z-transform. **[6]**

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Total No. of Questions : 7]

SEAT No. : ____

PC3935

[Total No. of Pages : 3

[6344]-102
M.Sc. - I
ELECTRONIC SCIENCE
ELUT-112 : Analog Circuit Design
(2019 Pattern) (Semester - I)

Time : 3 Hours] ***[Max. Marks : 70***

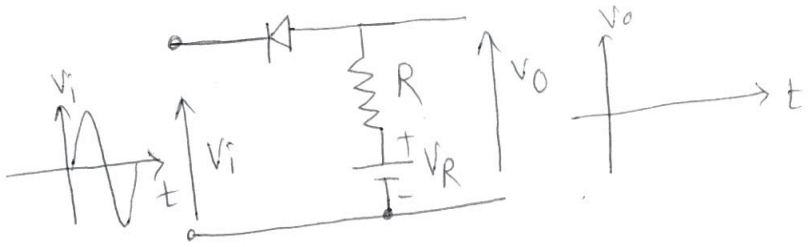
Instructions to the candidates:

1) ***Queston 1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Q.2 to 7 carry equal marks.***

Q1) Attempt any FIVE of the following. **[10]**

a) What is avalance breakdown phenomena?

b) Identify following circuit & draw output waveform.



c) Define I_{DSS} and g_m For MOSFET.

d) Draw equivalent circuit of piezoelectric crystal.

e) "Tuned amplifiers are used for narrowband frequency amplification" comment.

f) What are important features required for instrumentation amplifier?

Q2) Attempt the following.

a) Explain the working of two stage RC coupled amplifier. What are advantages and disadvantages of it? **[7]**

b) What are large signal tuned amplifiers? Why Class-C amplifier is selected for large tuned amplifier design? Explain it with circuit diagram and output wave forms. **[5]**

P.T.O.

Q3) Attempt the following.

a) What are the advantages of transistor hybrid model? Explain hybrid model for common emitter circuit of transistor with circuit diagram. **[7]**

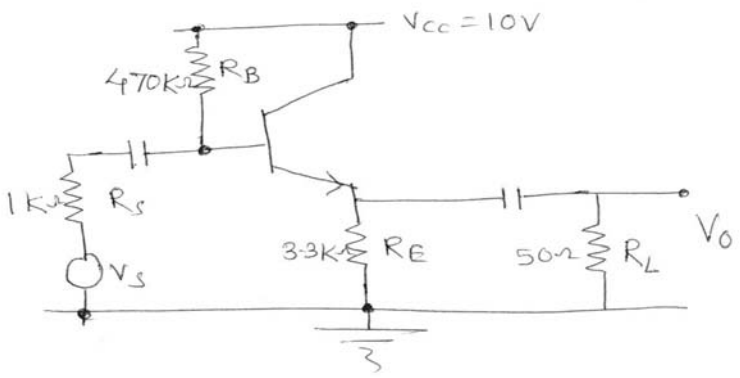
b) For a BJT, $\alpha = 0.98$, $I_{co} = 0.6\mu A$. This BJT is connected in the common emitter mode and operated in active region with a base drive current $I_B = 20\mu A$. What is collector current I_c? **[5]**

Q4) Attempt the following.

a) Explain the working of transisterised wien Bridge oscillator & derive the equation of frequency of oscillation. **[7]**

In wien bridge oscillator if R = 10kΩ, F = 10KHz find the value of capacitor C.

b) The common collector amplifier has $V_{cc} = 10v$, $R_B = 470k\Omega$ & $R_E = 3.3K\Omega$; $\beta = 100$. Find the input inpedance of amplifier (Zi). **[5]**



Q5) Attempt the following.

a) What are advantages of active filters? Explain working of 2nd order active high pass filter with neat diagram. Design a high pass filter with cut off freq 1KHz and pass band gain of 2. **[7]**

b) A FET has a drain current of 4mA. If $I_{DSS} = 8mA$ & $V_{GS(off)} = -6V$, find the values of V_{GS} & V_P **[5]**

Q6) Attempt the following.

a) What are applications of JFET? What are effects of temperature on parameters of JFET? **[7]**

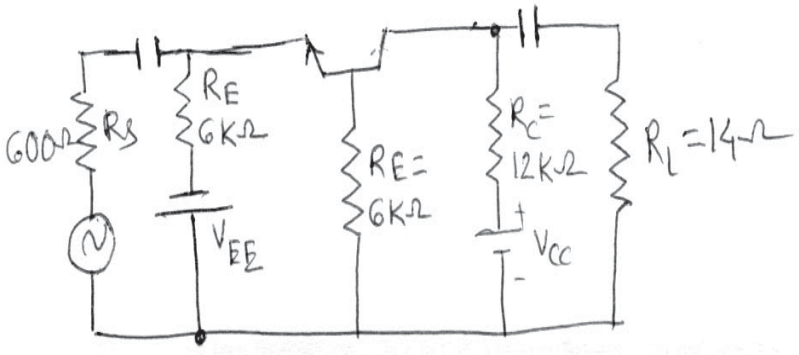
b) What is PLL? What are it's aplications? Explain working of PLL with it's block Diagram. **[5]**

Q7) Attempt any two of the following. **[12]**

a) Explain practical integrator circuit using op-awp. Draw frequency response of it state applictions of integrator.

b) What are different types of distortion in amplifiers? Explain in brief.

c) Calculate the values of input resistance, output resistance current gain & voltage gain for CB amplifier for a given circuit. The transistor h parameters are hib = 24Ω, h_{fb} = 0.98. hob = 0.4gμA/V, hrb =2.9 ×10^{-4}



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Total No. of Questions : 7]

SEAT No. :

PC3936

[Total No. of Pages : 2

[6344]-103
M.Sc. - I
ELECTRONIC SCIENCE
ELUT113 : Digital System Design
(2019 Pattern) (Semester-I) (Credit System)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Attempt any five questions from question 2 to question 7.***
3) ***Figures to the right indicate full marks.***
4) ***Use of nonprogrammable calculator is allowed.***

Q1) Solve any five of the following. **[10]**

a) Write verilog code for 2:4 decoder

b) State the need and use of PLD's

c) What is gate delay? List various types of delay in verilog.

d) Explain with the help of example Nets in verilog.

e) Write the state table of T and D flip-flop.

f) State any two loop structure in verilog with the help of syntax.

Q2) Attempt the following:

a) Design 4 bit comparator and write verilog code by using if-else statement. **[7]**

b) Explain 'blocking' and Non-blocking' assignment statements with examples. **[5]**

P.T.O.

Q3) Attempt the following:

a) i) Write verilog code for half adder. Design 4bit parrallel adder using half adder. **[4]**

ii) Explain look-ahead carry generator. **[3]**

b) What is priority encoder? Design 8:3 encoder and write verilog code using behavioural modeling. **[5]**

Q4) Attempt the following:

a) Design BCD counter using common anode seven segment display. Using k-map obtain the Boolean expression for "d" & "f" segment. **[7]**

b) Draw schematic of DRAM cell. Distinguish between DRAM and SRAM. Comment on DRAM refreshing. **[5]**

Q5) Attempt the following:

a) i) State the difference between function and task in verilog. **[3]**

ii) State and explain four data types of verilog. **[4]**

b) Design traffic light control using FSM in verilog. **[5]**

Q6) Attempt the following:

a) Draw excitation table for RS and JK flip flop. Write verilog code for it. **[7]**

b) Write a verilog code for 4 bit Johnson counter. Write its test bench. **[5]**

Q7) Attempt any two of the following. **[12]**

a) Draw and explain typical design flow for designing digital circuits using verilog. Explain the technique to declare modules in verilog.

b) What is FSM? Explain move state machine.

c) Draw block diagram of FPGA. Explain function of each block. How it differs from CPLD. List various devices of CPLD.

Total No. of Questions : 5]

SEAT No. : ____

PC3937

[Total No. of Pages : 4

[6344]-104

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELDT 114 : Basics of Fiber Optic Communication

(2019 Pattern) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.No. 2 to Q.No. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagram must be drawn whenever necessary.***
5) ***Use of calculator is allowed.***

Q1) Attempt any five of the following : **[5]**

a) What is acceptance cone?

b) What do you mean by meridional ray?

c) State the different types of optical fiber.

d) List the factors due to which connector losses occur.

e) Enlist any two optical sources.

f) Define the term total internal reflection.

Q2) Answer the following : **[10]**

a) i) Explain the LED driver circuit. **[2]**

ii) With neat diagram explain the term acceptance angle and acceptance cone indicating reflected ray & lost ray. **[4]**

b) With neat diagram explain the structure of fiber optic cable. **[4]**

P.T.O.

Q3) Answer the following : **[10]**

a) i) Explain the macro & micro bending loss in fiber cable. **[2]**

ii) Describe what is meant by fusion splicing of optical fibers. **[4]**

b) When the mean optical power launched into an 8 km length of fiber is 120 μW, the mean optical power at the fiber output is 3μW. Calculate, signal attenuation in dB per unit (km) length. **[4]**

Q4) Answer the following : **[10]**

a) i) State any two advantages of optical fiber communication. **[2]**

ii) What is fiber splice? State the types of fiber splice, explain any one splicing method in detail. **[4]**

b) With block diagram explain the optical fiber communication. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Explain LASER driver circuit.

b) Advantages & disadvantages of fusion splicing.

c) Problem of fresnel reflection at all types of optical fiber joints.

d) Discuss the terms critical angle.

e) Discuss the effect of attenuation on optical fiber communication.

f) Discuss the need of repeaters in optical fiber communication.

Total No. of Questions : 5]

PC3937

[6344]-104

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELDT 114 : Fundamentals and Applications of PIC Microcontroller

(2019 Pattern) (Semester - I) (2 Credits)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.No. 2 to Q.No. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagram must be drawn whenever necessary.***

Q1) Solve any five **[5]**

a) Which condition of MCLR (master clear) pin allow to reset the PIC?

b) Which operational feature of PIC allows it to reset especially when the power supply drops the voltage below 4v?

c) How many clock pulses are confined by each instruction cycle of PIC?

d) Mention SFR's associated with PIC I/o PORTS.

e) Give importance of debounce period in keyboard scanning.

f) Give the use of CALL instruction in PIC.

Q2) Solve the following : **[10]**

a) i) Which features of RISC architecture helps to increase the execution speed in microcontroller? **[3]**

ii) Explain different addressing modes of PIC with suitable examples. **[3]**

b) Write assembly language program for PIC to implement 8-bit ring counter on LED's connected to PORT B. **[4]**

Q3) Solve the following : **[10]**

a) i) Write PIC assembly program to get byte of data from PORTC and if it is less than 100. Send it to PORTB other wise send it to PORTD. **[3]**

ii) Explain the interrupt structure of PIC. **[3]**

b) Assume WREG has 2-digit packed BCD number, write an assembly language program for PIC to convert 2-digit packed BCD number to two ASCII numbers and place them in file register location 6 and 7. **[4]**

Q4) Solve the following : **[10]**

a) i) Write PIC assembly to substract 5 from WREG 5 times & send the result in PORT D. **[3]**

ii) Draw memory organization of PIC and explain in short. **[3]**

b) Draw interfacing of DC motor to PIC. Write PIC assembly program to rotate motor anticlockwise. **[4]**

Q5) Solve any four **[10]**

a) Explain clock frequency options available to PIC18 microcontroller.

b) Describe any three Arithmatic instruction of PIC 18 with example.

c) Write differences between GOTO and BRA instruction in PIC.

d) Give any three advantages PIC over other microcontrollers.

e) Write a note on pipelining concept.

f) Draw the flowchart for interfacing LCD display to PIC to display “Hello” message on it.

Total No. of Questions : 7]

SEAT No. :

PC3938

[Total No. of Pages :2

[6344]-201

First Year M.Sc.

ELECTRONIC SCIENCE

ELUT 121 : Applied Electromagnetics, Microwaves and Antennas

(2019 Pattern) (Semester- II) (Credit 4)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Q.2 to Q.7 carry equal marks.***

Q1) Solve any Five of the following: **[10]**

a) What is the Role of Reflector in Yagi uda Antenna?

b) State the difference between characteristic impedance and Intrinsic impedance.

c) Write down application of magnetron.

d) Write Maxwell equation in differential form.

e) A Transmission line has Reflection coefficient of $0.4\angle 92°$ find voltage standing wave Ratio.

f) Determine Skindepth of copper operated at frequency 60 Hz (Given $\mu = 4\pi \times 10^{-7}$ H/m, $\sigma = 58$ M mho/m).

Q2) Attempt the following:

a) With the help of equivalent circuit obtain transmission line equation in voltage & current form. What is characteristics of impedance of a line? **[7]**

b) With the help of neat labelled diagram, describe the feature of yagi-uda Antenna. Which Antenna is widely used in space communication? **[5]**

Q3) Attempt the following:

a) Explain in brief following parameters of Antenna **[7]**

i) Gain
ii) Directivity
iii) Radiation pattern
iv) Aperture

b) A certain transmission line has characteristics impedance of $75 + j0.01\Omega$ and terminated at load impedance $70 + j50\ \Omega$ compute **[5]**

i) Reflection coefficient
ii) Transmission coefficient

P.T.O.

Q4) Attempt the following:

a) Define the term Microstripline. Discuss Different types of losses occur in microstripline with suitable diagram. **[7]**

b) A Rectangular wave guide measure 3 × 4.5 cm internally and has a 10 GHz signal propogated in it calculate cut off frequency (λc) and the guided wavelength (λg). **[5]**

Q5) Attempt the following:

a) What is Skin depth? Derived expression for the same. What are the various practical application of these phenomenon? **[7]**

b) Radiation Resistance of an Antenna is 72 Ω and loss Resistance 8 Ω. What is the Directivity in dB if power gain of Antenna is 16. **[5]**

Q6) Attempt the following:

a) With the help of Neat diagram. Explain how TMOI & TEII modes can be excited in circular wave guide. **[7]**

b) Starting with maxwell curl equation for charge free medium with finite conductivity, obtain wave equation for E and H vectors. **[5]**

Q7) Write short notes on any Two of the following: **[12]**

a) Write a short note on Cavity Resonator.

b) Write a short note on Single Stub matching and Double Stub matching.

c) Write a short note on a Reflex Klystron Oscilator.

Total No. of Questions : 7]

SEAT No. : ____

PC3939 **[6344]-202** **[Total No. of Pages : 3**

First Year M.Sc.
ELECTRONIC SCIENCE
ELUT-122: Instrumentation and Measurement Techniques
(2019 Pattern) (Semester - II) (Credit System)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Attempt any five questions from question 2 to question 7.***
4) ***Question 2 to question 7 carry equal marks.***
5) ***Use of non-programmable calculator is allowed.***

Q1) Solve any five of the following: **[10]**

a) Write advantages of resistance potentiometer.

b) What is function of signal manipulating element.

c) What is linearity and threshold.

d) A moving coil voltmeter has a uniform scale with 100 divisions, the full scale reading is 200V and 1/10 of a scale division can be estimated with a fair degree of certainty. Determine the resolution of the instrument in volt.

e) Why electronic instruments are better than electrical and mechanical instruments.

f) At the input an amplifier has a signal voltage level of 3μv and a noise voltage level 1μv. What is the signal to noise ratio at the input?

If the voltage gain of the amplifier is 30, what is the signal to noise ratio at the output?

Q2) Attempt the following.

a) Describe thermocouple in detail. Describe methods of measurement of output voltage of thermocouple and types of compensation used in thermocouple. **[7]**

b) Explain loading effect due to shunt connected instruments with suitable example. How loading effect minimized in this case? **[5]**

P.T.O.

Q3) Attempt the following.

a) Explain working principle of strain gauge. Derive an expression for gauge factor of it. **[7]**

b) A pitot tube is used to measure the velocity of an air stream at 20^{o}c and 0.1 MPa. If the velocity is 10 m/s, what is the dynamic pressure in N/m^2? What is the uncertainty of the velocity measurement and percentage uncertainty, if the dynamic pressure is measured with a manometer having an uncertainty of 1 Pa? **[5]**

Q4) Attempt the following.

a) Derive dimension less transfer function of second order instrument from above transfer function discuss different types of system and their response. **[7]**

b) A steel cantilever is 0.25 m long, 20 mm wide and 4 mm thick.

i) Calculate the value of deflection at the free end for the cantilever when a force of 25 N is applied at this end. The modulus of elasticity for steel is 200 GN/m^2.

ii) An LVDT with sensitivity of 0.5 V/mm is used. The voltage is read on a 10V voltmeter having 100 divisions $2/10^{th}$ of division can be read with certainty.

iii) Calculate the minimum and maximum value of force that can be measured with this arrangement. **[5]**

Q5) Attempt the following. **[7]**

a) Explain the phenomenon Hysterisis in brief.

A circuit was funed for resonance by eight different students and the values of resonant frequency in KHz were recorded as 530, 548, 543, 535, 546, 531, 540 and 536.

Calculate

i) the arithmatic mean

ii) deviation

iii) average deviation

iv) standard deviation

v) varience

b) Calculate the time constant of first order mercury in glass thermometer inside diameter of the bulb 4 mm, assuming the bulb to be spherical, density of mercury = 13600 Kg/m^3, specific heat = 0.15 KJ/kg^oc, heat transfer coefficient = 40 $W/m^2\,^oc$.

If the thermometer bulb had been cylindrical in shape having the same volume and diameter as the spherical bulb, what would be the time constant if neglecting both the ends of the cylinder. **[5]**

Q6) Attempt the following.

a) Explain thermistor in detail with construction, working and resistance temperature characteristics. State silent features and applications of it.**[7]**

b) Describe piezoelectric transducer. Derive an expression for charge sensitivity and voltage sensitivity. **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) Infrared Pyrometer.

b) Any three methods of correction of instruments.

c) Factors influencing the choice of transducer.

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Total No. of Questions : 7]

SEAT No. :

PC3940

[Total No. of Pages : 3

[6344]-203

M.Sc. I

ELECTRONIC SCIENCE

ELUT-123 : Foundation of Semiconductor Devices

(2019 Pattern) (Semester-II) (Credit System)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Attempt any five questions from question 2 to question 7.***
4) ***Question 2 to question 7 carry equal marks.***
5) ***Use of non-programmable calculator is allowed.***

Q1) Solve any five of the following: **[10]**

a) What are the specifications of a transistor?

b) What are the amphoteric impurities? Give examples.

c) What are the Millar Indices of a plane making intercepts 2a, 3b and 6c on three axes?

d) Compare direct band gap and indirect band gap semiconductor material.

e) Which semiconductors are called 'narrow band gap' and which are called 'wide band gap'?

f) Calculate the internal pinch off voltage of an n-channel JFET. Assume that the pn junction of uniformly doped silicon n-channel JFET at T=300k has doping concentration of Na = 10^{18} cm^{-3} and Md = 10^{16} cm^{-3}, $\varepsilon s = 11.7 \times 8.85 \times 10^{-14}$ ($q = 1.6 \times 10^{-19}$)

Q2) Attempt the following:

a) Explain the Czochralski method and liquid phase epitaxy for semiconductor crystal growth. **[7]**

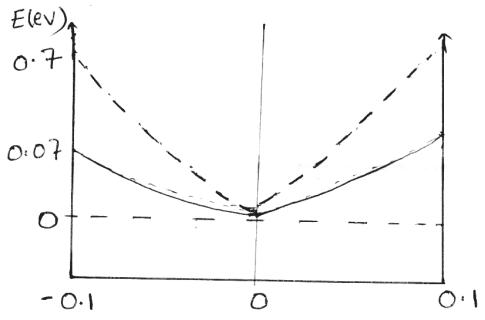
b) Explain the energy band diagram of MOS capacitor with n-type substrate in accymulaion depletion, and inversion modes. **[5]**

P.T.O.

Q3) Attempt the following:

a) Explain Ebers-Moll model for BJT. How does it used to define equation for I_E and I_c. Draw the basic Ebers-Moll equivalent circuit for NPN and PNP BJT. **[7]**

b) Following figure shows the parabolic Eversus k relationship in the conduction band for an electron in two particular semiconductor materials determine the effective mass (in units of the free electron mass) of the two electrons. **[5]**



Q4) Attempt the following:

a) What is the Schro dinger equation? Derive the time independant Schro dinger's wave equation for a free particle. Discuss the solution for a particle in one dimensional potential well of infinite height by using schro dinger wave time independant wave equation. **[7]**

b) Consider a gallium arsenide sample at T=300k with doping concentration of Na= O and $N_d = 10^{16}\ cm^{-3}$ assuming that complete ionization of electron and calculate the drift current density and if the applied electric field is E=10v. Calculate the drift current density in a semiconductor for given electric field. **[5]**

Q5) Attempt the following:

a) Describe the lattice structure of simple cubic, body centered cubic and face centred cubic. Show that packing fraction of BCC structures is 0.68. **[7]**

b) Explain the process of zener and avalanche breakdown that ocurs in a p-n junction diode. **[5]**

Q6) Attempt the following:

a) Explain the position of Fermi level in extrinsic semi conductor using the energy band diagram and obtain relation for the same. **[7]**

b) Explain the construction and operation of a MESFET. Discuss its LV characteristics. **[5]**

Q7) Write short notes on any two of the following: **[12]**

a) Substitutional and interstitial defects using suitable sketches. Give one example of each.

b) Formation of allowed and forbidden energy bands in solids, with proper energy level diagram.

c) Effect of temperature on mobility of carriers

Total No. of Questions : 5]

SEAT No. :

PC3941

[Total No. of Pages : 2

[6344]-204

M.Sc. - I

ELECTRONIC SCIENCE

ELDT 124 : Fiber Optic Communication Systems

(2019 CBCS Pattern) (Semester-II) (2 Credits)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three questions from 2 to 5.***
3) ***Draw neat diagram wherever necessary.***

Q1) Attempt any five of the following: **[5]**

a) List the various applications of (LASER) used in industries.

b) State the functions of optical switches.

c) What do you mean by DWDM?

d) State the functions of OTDR.

e) What is dispersion?

f) What do you mean by attenuation in fiber optic communication.

g) State the types of WDM.

Q2) a) Attempt any two of the following: **[6]**

i) Explain in details the working of optical power meter.

ii) Explain link power budget with suitable example.

iii) Write the functions of beam splitter and optical multiplexer.

b) Explain the working of Eribium doped fiber amplifier. **[4]**

P.T.O.

Q3) a) Attempt any two of the following: **[6]**

i) Explain the system consideration in optic fiber communication.

ii) Explain the line coding in optical communication.

iii) Explain the fiber Bragg grating.

b) Consider an InGaAsP SOA with w=5 μm and d=0.5 μm. Given that $V_g=2\times10^8$m/s. If 1.0μw optical signal at 1550 enters the device, what is the photon density? **[4]**

Q4) a) Attempt any two of the following: **[6]**

i) Explain the operational principles of WDM.

ii) Explain the frequency domain dispersion measurement technique.

iii) State and explain the working principle of optical time domain reflecter.

b) A device engineer to construct a 32×32 coupler from a cascade of 2×2, 3dB single mode fiber coupler. How many 2×2 elements are needed for this? **[4]**

Q5) Attempt any four of the following. **[10]**

a) Explain optical multiplexer and de-multiplexer.

b) Explain Raman Amplifier in breif.

c) List the applications of LASERS in industry and medical surgery.

d) Explain the rise time budget with suitable examples.

e) Explain the working of eye pattern.

f) Explain the role of beam splitter in OFC.

Total No. of Questions : 5]

PC3941

[6344]-204

M.Sc. - I

ELECTRONIC SCIENCE

ELDT 124 : Fundamentals and Applications of AVR Microcontroller

(CBCS 2019 Pattern) (Semester-II) (2 Credits)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three questions from 2 to 5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Answer any five of the following: **[5×1=5]**

a) State the commands to initialize an LCD for 5×7 matrix characters in 8-bit operating mode.

b) Which flag bit of status register updated when SEI and CLI instruction are executed in AVR microcontroller.

c) How many timer registers available in AVR microcontroller?

d) Name the current driver IC used to interface DC motor with AVR microcontroller.

e) Find step angle for stepper motor, if 200 steps required to complete one revolution?

f) What is the address in the interrupt service routine assigned for the time 0 overflow flag?

Q2) Answer the following:

a) Explain the LED inter facing diagram with AVR microcontroller and write 'c' program code for toggle bits of PORTA. **[6]**

b) Draw the status register format and explain each flag bit set and reset of AVR microcontroller. **[4]**

Q3) a) Answer the following:

i) Show how the flag register is affected by the following instructions. **[2]**

LDI R21, 0×F5

LDI R22, 0×0B

ADD R21, R22

ii) For an 10-bit ADC have Vref=10V, calculate the D_0–D_9 digital output if the analog inputs is **[4]**

1) 1.8V

2) 2.1V

b) Draw and explain architecture block diagram of AVR micro controller. **[4]**

Q4) Answer the following.

a) i) What are the types of addressing modes of AVR micro controller. **[2]**

ii) What are the types of seven segment display? Name in whic seven segment display IC 7446 and IC 7447 are used as decoder driver? **[4]**

b) Write an assembly language program to convert ASCII 34 and ASCII 37 into packed BCD number. **[4]**

Q5) Write short notes on any four of the following. **[10]**

a) Data memory of AVR microcontroller.

b) PWM in AVR micro controller.

c) Input output ports of AVR micro controller.

d) The applications for stepper and servo motor.

e) Real time clock (RTC) DS1302.

f) I^2c and SPI serial protocol.

Total No. of Questions : 7]

SEAT No. : ____

PC-3942

[Total No. of Pages : 2

[6344]-301

M.Sc. (ELECTRONIC SCIENCE)

ELT 231 : ADVANCED COMMUNICATION SYSTEMS

(2019 Pattern) (Semester - III) (Paper - I) (Credits - 4)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Q.2 to Q.7 carry equal marks.***

Q1) **Solve Any Five of the following:** **[10]**

a) Define SNR.

b) Mention the types of multiple access technique.

c) State Kepler's first law.

d) Define

i) Bit rate ii) Baud rate

e) Calculate Frequency deviation of FM signal with modulating frequency of 5KHz & Modulation index of 0.5.

f) A carrier signal with power of 40 watts is amplitude modulated by a sinusoidal signal. Find the power of the modulated signal if modulation index is 0.7.

Q2) a) With reference to an antenna. Explain following terms **[4]**

i) Directivity ii) Bandwidth

iii) Radiation patterens iv) Gain

b) Explain XMODEM protocol. Describe fields of the XMODEM protocol frame. **[4]**

c) With the help of block diagram. Explain the working of FM receiver. **[4]**

P.T.O.

Q3) a) Explain smart antenna and write its benefits and draw backs. **[4]**

b) What is active satellite and passive satellite. **[4]**

c) Construct Hamming code for data information 1001 with even parity. **[4]**

Q4) a) With the reference of propagation of wave explain the terms. **[4]**

i) Ionospheric propagation.

ii) Tropospheric propagation.

b) Draw the diagram of cassegrain fed parabolied reflector antenna & explain its working in short. **[4]**

c) A 400 watt carrier is modulated to a depth of 75%. calculate the total power in the modulated wave. **[4]**

Q5) a) Explain the working of satelite communication. **[4]**

b) A bit strem 1101011011 is transmitted using the standard CRC method. The generator polynomial is $x^4 + x + 1$. What is the actual bit string transmitted. **[4]**

c) Compare Amplitude modulation and frequency modulation. **[4]**

Q6) a) With the help of block diagram explain PCM system. **[4]**

b) What are basics fundamental of GPRS and write it's benefit's. **[4]**

c) An amplifier operating on a frequency range from 18 to 20 MHz has a 10kΩ input resistance. Find the r.m.s Noise voltage at the input to this amplifier if the ambient temperature is 17°C. **[4]**

Q7) **Write short notes on any Two of the following:**

a) Explain the GSM System. **[6]**

b) With help of block diagram Explain the working of FDM system. **[6]**

c) With the reference to small dipole antenna explain the terms. **[6]**

i) Power density

ii) Radiation resistance

iii) Radiation pattern

Total No. of Questions : 7]

SEAT No. :

PC3943

[Total No. of Pages : 2

[6344]-302
M.Sc. - II
ELECTRONIC SCIENCE
ELT-232 : Mechatronics and Robotics
(2019 Pattern) (Semester - III) (4 Credit)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn whenever necessary.***
5) ***Use of calculator is allowed.***

Q1) Solve any FIVE of the following. **[5×2=10]**

a) What is mechatronics?

b) Define DC motors.

c) What is system models?

d) Define angular velocity.

e) What is actuator?

f) What is manipulator?

Q2) Attempt the following.

a) i) What is sensors and actuators? **[3]**

ii) Explain solid state switches diodes used in mechatronics system. **[4]**

b) What is Robot? Explain components and structure of Robot. **[5]**

Q3) Attempt the following.

a) i) What is first order system? Give it's example. **[3]**

ii) Explain mechanical system building blocks in brief. **[4]**

b) Write a note on composition law for rotational transformation. **[5]**

P.T.O.

Q4) Attempt the following.

a) i) What is gear and gear ratio? **[3]**

ii) What is bearing? Write it's types and explain any one. **[4]**

b) Explain links, toggle and linkage used as mechanical actuating system. **[5]**

Q5) Attempt the following.

a) i) What is trajectory planning? Give one example. **[3]**

ii) Explain electrical and mechanical analogies and their use in analysis. **[4]**

b) Draw and explain single phase AC motor. **[5]**

Q6) Attempt the following.

a) i) Define force. Control manipulator. **[3]**

ii) Draw and explain basic structure of feed back control system. **[4]**

b) Explain joint space scheme via point and line motion. **[5]**

Q7) Write short notes on any Two of the following. **[2×6=12]**

a) Stepper motor

b) Euler angle representation

c) Rack and pinion & Ratcht and Pawl

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Total No. of Questions : 7]

SEAT No. :

PC3944

[Total No. of Pages : 2

[6344]-303

M.Sc. - II

ELECTRONIC SCIENCE

ELT 233 : Control Systems

(CBCS 2019 Pattern) (Semester-III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five questions from question 2 to question 7.***
3) ***Q.2 to Q.3 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of Non-programmable calculator is allowed.***

Q1) Solve any five of the following. **[10]**

a) What is offset in process control?

b) What are different methods available for frequency response plot?

c) Sketch the ouput of PD controller for a step input.

d) What are the typical types of advanced control strategies?

e) With the help of block diagram, illustrate the control of a car by the driver and identify the components of this closed-loop system.

f) Determine the transfer function of high pass filter (RC).

Q2) Answer the following:

a) Explain feed forward and adaptive control systems with suitable example. **[7]**

b) Find the stability of the control system having characteristic equation. (use Routh criteria) **[5]**

$F(s) = S^5 + 3S^4 + S^3 + 3S^2 + S + 3 = 0$

P.T.O.

Q3) Answer the following:

a) With the help of block diagram explain room temperature control system. **[7]**

b) A liquid-level control system linearly converts a displacement of 2 to 3m into 4 to 20 mA control signal. A realy serves as the two position controller to open and closed the inlet valve. The realy closed at 12 mA and open at 10mA find. **[5]**

i) The relation between displacement level and current.

ii) The neutral zone or displacement gap in meter.

Q4) Answer the following:

a) Explain the concept of gain margin and phase margin. Explain how these values help in studying stability of Bode plot. **[7]**

b) Elaborat the statement 'Evolution of process control has been from manual to computer to network control'. **[5]**

Q5) Attempt the following:

a) Explain the working of op-amp based PID cntroller. Derive equation for its output voltage. **[7]**

b) Explain canonical form of block diagram for close loop system. Derive it's transfer function. **[5]**

Q6) Answer the following:

a) Discuss how the root locus of a system will be affected by adding poles and zeros to the existing system. **[7]**

b) Explain the application of control system for speed control of dc motor? **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) Direct Digital Control (DDC)

b) PI controller

c) Control valve

Total No. of Questions : 5]

SEAT No. : ____

PC3945

[Total No. of Pages : 4

[6344]-304

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELT 234 : Wireless Communication Systems - I

(2019 Pattern) (Semester - III) (Elective Theory Course)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.No. 2 to Q.No. 5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define WLL.

b) Define WLAN.

c) Define RFID.

d) Explain the meaning of MIMO.

e) Explain the meaning of OFDM.

f) Explain the functions of a RAKE Receiver.

Q2) a) i) Define Smart Anteenna. **[2]**

ii) Define GSM system? **[4]**

Name the three major interconnected subsystems in GSM architecture.

b) Give any four examples of wireless communication system. **[4]**

P.T.O.

Q3) a) i) What is mean by CDMA? **[2]**

ii) Write a note on Power Control in CDMA **[4]**

b) Write a note on Cord less phone. **[4]**

Q4) a) i) What is personal Areal Networks. **[2]**

ii) Write a note on Second generation cellular networks. **[4]**

b) Write a note on Localization & Calling. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Handover.

b) Authentication and security in GSM.

c) GSM speech coding.

d) Paging systems.

e) Wireless Networks.

f) Air interface.

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Total No. of Questions : 5]

PC3945

[6344]-304

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELT 234 : Fundamentals of Internet of Things

(2019 Pattern) (Semester - III) (Elective Theory Course)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.No. 2 to Q.No. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Color pencil use (other then red color) is not restricted.***

Q1) Attempt any five of the following : **[5]**

a) Define IoT.

b) Give any two types of sensors used for defence purposes.

c) WSN is abbrevation for what?

d) List the components of RFID system.

e) What is longterm of EPCIS?

f) Explain need of ITV.

Q2) Attempt the following : **[10]**

a) i) What is longterm and role of MQTT? **[2]**

ii) Explain any four IoT Applications in details. **[4]**

b) Explain four layer IoT Architecture. **[4]**

Q3) Attempt the following : **[10]**

a) i) Why IP needed? **[2]**

ii) Explain Device Intelligence. **[4]**

b) Explain mobility support. **[4]**

Q4) Attempt the following : **[10]**

a) i) What is IoT Scalability? **[2]**

ii) List and explain any four advantages of WNS. **[4]**

b) Explain any four RFID circuit design issues. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) IoT protocols.

b) Use of Artificial Intelligence with IoT.

c) Quality of service.

d) WSN Security.

e) Satellite Technology for communication.

f) Web of Things.

Total No. of Questions : 5]

SEAT No. : ____

PC3946

[Total No. of Pages :2

[6344]-401

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELT 241 : PLC Programming and Applications

(2019 Pattern) (Semester- IV) (Credit - 2)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn whenever necessary.***

Q1) Answer any Five of the following: **[5×1=5]**

a) List any four devices that can be connected to input of PLC.

b) Which instruction is used to test whether one value is Not equal to second value?

c) Which instruction is used to reset the counter?

d) What is the difference between TON and RTO instructions.

e) What is the use of MCR instruction.

f) List any four data comparison instructions.

Q2) Answer the following questions:

a) i) Explain off-delay timer instruction in detail. **[3]**

ii) What is meant by ladder diagram? Explain the functions NO, NC and output coil in relation with ladder diagram. **[3]**

b) Explain processor memory organization of PLC with necessary diagram. **[4]**

Q3) Answer the following questions:

a) i) Explain Down counter instruction in detail. **[3]**

ii) Explain greater than and less than equal instructions in detail. **[3]**

b) Draw ladder diagram for car parking system. **[4]**

P.T.O.

Q4) Answer the following questions:

a) i) Draw ladder diagram for following logical **[3]**

Sum = $\bar{A}B + A\bar{B}$

Carry = AB

ii) What is the function of input module in PLC? Draw block diagram of discrete input module and explain in brief. **[3]**

b) Draw the ladder diagram for switching three motors ON one by one at 10 seconds interval when START push button is pressed. **[4]**

Q5) Write short note on any four of the following: **[4×2½=10]**

a) Fixed PLC

b) PLC programming languages

c) Sinking and sourcing

d) PLC scan cycle

e) Role of PLC in automation

f) MOV instruction

Total No. of Questions : 7]

SEAT No. : ____

PC3947 **[6344]-402** **[Total No. of Pages : 2**

S.Y.M.Sc.
ELECTRONIC SCIENCE
ELT 243: Technical Writing
(2019 Pattern) (Semester - IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Q. 2 to Q. 7 carry equal marks.***
4) ***Figures to the right indicate full marks.***

Q1) Solve any five of the following: **[10]**

a) What is linguistics?

b) State the significance of report writing.

c) How can language be a tool of communication?

d) List the different types of interviews.

e) Define upward communication with an example.

f) What do you mean by critical thinking.

Q2) a) Differentiate between technical communication and general communication. **[7]**

b) What do you mean by group discussion? Write do's and dont's for group discussion. **[5]**

Q3) a) Define barriers to communication. Differentiate between interpersonal and intrapersonal barrier. **[4]**

b) What is a keynote speech? Write about its significance. **[3]**

c) What do you mean by audience analysis? Explain different factors to be considered in audience analysis. **[5]**

P.T.O.

Q4) a) Define the flow of communication. Explain the various flows of communication in details. **[7]**

b) What is reading? Explain the types of reading in brief. **[5]**

Q5) a) What is a proposal? Describe the various objectives of writing proposals. **[4]**

b) What is an oral presentation? Explain main parts of an oral presentation. **[3]**

c) What is a thesis? Explain the structure of the thesis in detail. **[5]**

Q6) a) Define business communication? Discuss the 7c's of business writing in detail. **[7]**

b) Define comprehension. Explain various comprehension skills in detail. **[5]**

Q7) Write a short note on any two of the following. **[12]**

a) Argumentation skills.

b) Strategies and techniques of presentation.

c) Classroom presentation skills.

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