Total No. of Questions : 5]

SEAT No. : ____

P797

[Total No. of Pages : 2

[4136] - 203
MSc. (Sem. II)
ELECTRONIC SCIENCE
EL02UT06 : Digital System Design Using VHDL
(2008 Pattern)

Time :3 Hours] ***[Max. Marks :80***

Instructions to the candidates:-

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) Attempt any two of the following. **[2 × 8 = 16]**

a) Explain in detail different VHDL object types. Explain predefined data types used in VHDL.

b) i) Write a VHDL code for J-K flip - flop.

ii) Write a function in VHDL for 4 - bit binary to gray code conversion.

c) Explain design flow for digital system design using VHDL.

Q2) Attempt any four of the following. **[4 × 5 = 20]**

a) Design 2 - bit digital comparator which accepts two numbers A = a1a0 and B = b1b0 and gives outputs GT, EQ, LT.

b) Implement the following function using 8 : 1 multiplexer.

$F(A, B, C, D) = \sum m(0, 1, 3, 4, 8, 9, 15)$

c) Design 3 - bit binary to gray code converter using 3:8 decoder.

d) Write a VHDL code for 8:3 encoder using conditional signal assignment statement.

e) Design4 - bit parallel adder using look ahead carry generator.

P.T.O.

Q3) Attempt any Two of the following. **[2 × 8 = 16]**

a) Design synchronous counter for the sequence 0 - 2 - 4 - 6 - 7 - 0 using J-K flip-flops.

b) What is FSM ? Write a VHDL code for stepper motor controller using FSM; which rotate motor in clockwise direction, if dir input is '1' and in anticlockwise direction, if dir input is '0'.

c) Write a VHDL code for washing machine controller.

Q4) Attempt any Two of the following. **[2 × 6 = 12]**

a) Implement the following functions using PAL.

W (A, B, C, D) = $\sum m$ (0, 2, 6, 7, 8, 9, 12, 13)

X (A, B, C, D) = $\sum m$ (0, 2, 6, 7, 8, 9, 12, 13, 14)

Y (A, B, C, D) = $\sum m$ (2, 3, 8, 9, 10, 12, 13)

Z (A, B, C, D) = $\sum m$ (1, 3, 4, 6, 9, 12, 14)

b) Define scratch pad memory. How it is distinguished from main memory? Explian processor unit employing a scratchpad memory.

c) Write VHDL code for 4 - bit ALU to perform arithmatic operations such as addition, subtraction, increment, decrement and logical operations such as OR, AND, NAND, NOR.

Q5) Attempt any Two of the following. **[2 × 8 = 16]**

a) Draw basic memory cell of MOS SRAM. Explain 16 × 8 RAM design using VHDL code.

b) Explain in brief Read only memory with reference to types, data storage principle, control inputs and applications.

c) Explain the architecture of FPGA. Write the applications of FPGA.

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Total No. of Questions : 5]

SEAT No. :

P792

[Total No. of Pages : 2

[4136] - 101
M.Sc. (Sem. - I)
ELECTRONIC SCIENCE
EL1 UT01 : Foundation of Semiconductor Devices
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candiates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of non-programmable calculator is allowed.***

Q1) Attempt any <u>two</u> of the following. **[2 × 8 = 16]**

a) Why pure crystal is required as a substrate in semiconductor device? List various methods used in growth of semiconductor material. Explain any one in detail.

b) Mathematically discuss position of Fermi level for n-type and p-type semiconductor. Comment on variation of E_F with doping concentration and temperature.

c) List frequency limitation factors in MOSFET. Obtain relation for cut off frequency in ideal case.

Q2) Attempt any <u>two</u> of the following: **[2 × 8 = 16]**

a) Describe operation of reverse bias p-n junction diode. Obtain relation for junction capacitance.

b) State importance of equivalent circuit models used in BJT analysis. Explain hybrid-pi model for this device.

c) What are the advantages of MOSFETs over JFETs ? Explain the small dimension effects with respect to threshold voltage and width.

P.T.O.

Q3) Attempt any <u>four</u> of the following. **[4 × 4 = 16]**

a) What is meant by probability density function? How it is useful in semiconductors.

b) Explain the concept of space lattices. Discuss unit cell and primitive cell.

c) Define Hall voltage. Why the polarity of Hall Voltage changes depending on the conducting type of semiconductor?

d) Calculate Quasi Fermi levels for electrons and holes.

e) Describe the charge flow in a forward biased schottley barrier diode.

Q4) Attempt any <u>four</u> of the following: **[4 × 4 = 16]**

a) What is a PIN photodiode? Explain its working in brief.

b) Explain with diagram working of Heterojunction Bipolar Transistor (HBT). State its applications.

c) Discuss switching characteristics of SCR. State its applications.

d) List recent MOSFET structures. Explain any one in detail.

e) Draw a diagram for MOSFET as two port network. Explain low frequency and high frequency response from this diagram.

Q5) Attempt any <u>four</u> of the following: **[4 × 4 = 16]**

a) Calculate surface density atoms in a body centered cubic (BCC) crystal.

b) Explain low frequency small signal two port equivalent circuit for characterising the ac response of the BJT.

c) For a certain transistor $\alpha_{dc} = 0.98$, $I_C = 5$ mA, and $I_{CBO} = 10$ μA, calculate I_B.

d) Discuss ideal CV characteristics of MOSFET.

e) Explain working of DIAC, TRIAC. State its applications.

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Total No. of Questions : 5]

SEAT No. :

P793

[Total No. of Pages : 2

[4136] - 102
M.Sc. (Sem. - I)
ELECTRONIC SCIENCE
EL1 UT02 : Analog Circuit Design and Analysis
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Use of log-table/non-programmable calculator is allowed.***

Q1) Attempt any four of the followings. **[4 × 4 = 16]**

a) Draw pole-zero diagram of a network function

$$F(s) = \frac{6}{(s+2)(s+5)}$$ and obtain F (t).

b) Solve the following by using Laplace Transformation,

F (t) = A and F $(t) = e^{\alpha t}$

c) For a two port network, deduce an expression for hybrid parameters.

d) Write a short note on Equilizers.

e) Draw the block diagram of operational amplifier and explain in brief the need of dc level shifter.

Q2) Attempt any two of the followings: **[2 × 8 = 16]**

a) Explain sigma-delta converter in detail.

b) i) Obtain Inverse Laplace Transformation of F (s),

$$F(s) = \frac{1}{s(s+1)}$$

ii) Explain the terms: Transfer function, poles and zeros of a network.

c) What are the practical design considerations of log-Amplifier? Explain temperature compensation technique. Draw the circuit diagram of practical log-amplifier.

P.T.O.

Q3) Attempt any two of the followings. **[2 × 8 = 16]**

a) Explain the following terms associated with op-amp.
   i) Input offset voltage
   ii) Open loop frequency response
   iii) CMRR and
   iv) Slew rate.

b) Explain in brief,
   i) Impedance Parameters and
   ii) Admittance Parameters.

c) i) With proper circuit diagram, explain R-2R Ladder.
   ii) A 4-bit D/A converter of type R-2R Ladder, has digital inputs 1001 and 1011.
   If $V_{ref} = 5V$, $R_f = 1K\ \Omega$ and $R = 5K\ \Omega$
   Estimate the output voltages for the given digital inputs.

Q4) Attempt any four of the followings: **[4 × 4 = 16]**

a) Write a short note on supply independent biasing.

b) Explain the need of Low power design.

c) Explain the practical design considerations of integrator circuit. Draw the practical integrator circuit diagram.

d) With proper circuit diagram, design a second order Butter worth high pass filter with gain for the following specifications:
$A_{CL} = 5$ ---- (op-amp in follower mode) cutoff frequency = 20 kHz
Assume timing capacitor of 0.01 μf.

e) With proper circuit diagram, explain in brief the working of widler current source.

Q5) Attempt any two of the followings: **[2 × 8 = 16]**

a) What are the important characteristics of instrumentation amplifier?

With proper circuit diagram of instrumentation amplifier using three op-amps, deduce an expression for its output voltage.

Justify "Without using high value resistors, the instrumentation amplifier offers high gain".

b) Explain the shielding and guarding techniques for op-amp circuit design.

c) i) Explain with circuit diagram, the output current boosting technique for a general purpose op-amp.
   ii) State at least two applications of DAC's and ADC's.

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Total No. of Questions : 5]

SEAT No. :

P794

[Total No. of Pages : 4

[4136] - 103

M.Sc.

ELECTRONIC SCIENCE

EL 1 UOT 03 : Instrumentation and Measurement Techniques (2008 Pattern) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carries equal marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of logarithmic table and non-programmable calculator is allowed.***

Q1) a) Answer any two. **[2 × 6 = 12]**

i) Describe different types of errors involved in measurement. What do you mean by accuracy of measurement system? A meter reads 127.50V and the true value of the voltage is 127.43 V. Determine static errov and static correction for the voltmeter.

ii) State different methods of measurements. Give the classification of instruments. Distinguish between deflection and null type instruments.

iii) Describe the dynamic characteristics of measurement system. A first order instrument is used to measure signals with frequency content upto 100 Hz with an amplitude accuracy of 5% .What is the maximum time constant? And the phase shift at 50 Hz.

b) We have a parallel circuit having two branches. The current in each branch is $1_1 = 100 \pm 2A$ and $1_2 = 200 \pm 5A$. Determine the value of total current by considering the errors in 1_1 and 1_2 as limiting errors and by considering the errors as standard deviations. Comment on the result. **[4]**

OR

P.T.O.

What is loading effect, if shunt connected instrument is connected to a circuit? Give suitable example to support your answer.

Q2) a) Answer any two. **[2 × 6 = 12]**

i) Define the following for the transducers-
Sensitivity
Drift
Hysteresis and linearity.

Classify the transducers based on-

1) Transduction Principle
2) Primary and Secondary
3) Passive and active type.

ii) State different types of strain gauges. Explain the construction of wire type strain gauge, if it is subjected to tensile force, determine the gage factor.

iii) Describe the piezo electric transducer, derive the expression for voltage, voltage sensitivity and charge sensitivity. Give the different modes of operation of piezo-electric transducer.

b) A potentiometer has a resistance of 2500 Ω and is rated at 2 W. What is the maximum allowable excitation? Calculate the value of sensitivity and resolution, if the length of the potentiometer is 0.1 meter and there are 150 tuns. Also calculate percentage loading error at 0.67 of its travel if a meter of 5000 Ω is connected across it. **[4]**

OR

List the primary sensing elements for force and torque measurement.

i) Determine the sensitivity of link type bad cell Wheatstone bridge combination if $S_g = 2$, Poisson's ratio = 0.3, $E_i = 10V$, $A = 5cm^2$ and young's modulus E = 200 GPa.

ii) The sensitivity of the transducer can be increased. If each gage in the bridge can dissipate lW of power, determine the maximum sensitivity that can be achieved without damaging the strain gauge having $R_g = 120\ \Omega$.

Q3) a) Answer any two. **[2 × 6 = 12]**

i) List the primary sensing elements used for pressure measurement. Describe the working principle of Mcleod gage and Knudsen gage. State application.

ii) State the different types of gages used for flow measurement. Describe the working principle of Ultrasonic flow meter and Electromagnetic flow meter. Write the applications of both flow meters.

iii) What is thermistor? Describe their different forms of construction. Show that they have very high sensitivity as compared with resistance thermometer by characteristic curve. Give salient features of thermistors. State applications of it.

b) An experiment is conducted to calibrate a copper-constantan thermocouple, with cold junction at 0^oC, emf obtained at boiling point of water (100^oC) and boiling point of sulfur (445^oC) are 5 mV and 25 mV respectively. If the relation is assumed to be $e–t_1–t_2 = a\,(t_1–t_2) + b(t_1^2 – t_2^2)$. Determine **[4]**

i) The constant a and b.

ii) The above thermocouple indicates 2 mV with the cold junction at 40^oC, determine the unknown hot junction temperature.

OR

For a thermistor, the resistance change with temperature as indicate by the relation-

$$R_T = R_o \exp\beta\left(\frac{1}{T} - \frac{1}{T_o}\right)$$

Where T_o and T are temperature in ^oK. The resistors R_o and R_T resistances in ohms at T_o and T respectively, β is constant in ^oK is given $\beta = 3450\ ^oK$. The resistance at 20^oC is $1000 \pm 2\ \Omega$. The thermistor is used for temperature measurement and the resistor measured as $2500 \pm 5\ \Omega$. Calculate the temperature and the maximum error in the measured temperature.

Q4) a) Answer any two. **[2 × 6 = 12]**

i) What is signal analysis? With neat circuit block diagram, describe working of wave analyzer used for audio and RF range. State Applications of wave analyzer.

ii) What is signal conditioning system? With neat block diagram, explain DC signal conditioning system.

iii) Derive the expression for bridge sensitivity in the case of voltage sensitive. Wheatstone bridge having equal arms.
Draw the bridge with sensitivity, balance and calibration features.

b) Describe the working of instrumentation amplifier using three op-amp configuration, give its o/p voltage equation.State advantages of lA over differential amplifier. **[4]**

OR

Define mean, deviation and standard deviation.
In voltage measurement following 10 observations are recorded: 41.7, 42.0, 41.8, 42.1, 42.0, 41.9, 42.5, 41.8 V 42.0 and 41.9V. find mean, standard deviation and probable error of one reading and probable error of mean and voltage range.

Q5) Answer any <u>four</u> **[4 × 4 = 16]**

a) Draw the circuit block diagram of general telemetry system and explain the working of it.

b) State different methods of telemetry systems. Explain the load line telemetry system.

c) Describe the advantages of digital indicating instruments over analog indicating instruments.

d) Describe the working of DMM with neat block diagram. How there are different ranges set for DC voltage measurement.

e) Draw the block diagram of basic strip chart recorder. Describe the moving mechanism used in it.

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Total No. of Questions : 5]

[Total No. of Pages : 4

P794

[4136] - 103
M.Sc.
ELECTRONIC SCIENCE
EL 1 UT 01 : Network Analysis & synthesis
(2004 Pattern) (Sem. - I)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carries equal marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of logarithmic table and non-programmable calculator is allowed.***

Q1) Solve any four. **[4 × 4 = 16]**

a) What is Routh criterian for stability of a system? Examine stability in

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

b) Give synthesis of RC driving point impedence list properties of it.

c) Explain the linearity property of a system. Determine $\Upsilon(n) = X(-n)$ is time variant or invariant.

d) Compare constant k filters over m-derived filters.

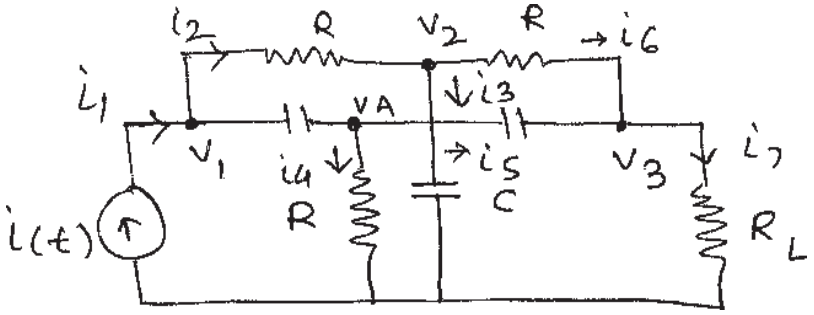
e) Give the quantitative sinusoidal steady state analysis for Purely inductive circuit.

Q2) Solve any four. **[4 × 4 = 16]**

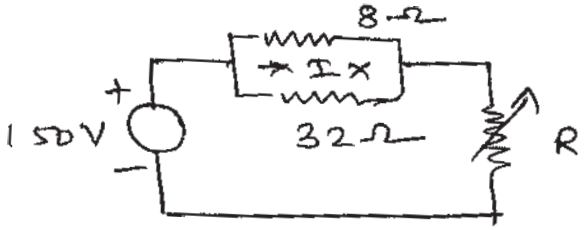
a) Find the laplace transformation of the sin wave extending from O to T and 2 T to3T.

P.T.O.

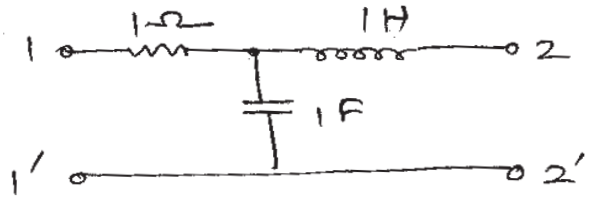
b) For the circuit determine the no of independent node to node voltages that may be used in writting the KCL equations.



c) The power dissipated in the 32 Ω resistance is 8 w. Find the value of resistor R.



d) Find Z parameters



e) The transfer voltage function V(s) is given by

$$V(s)=\frac{3s}{(s+2)(s^2+2s+2)}$$

plot the pole-zero plot and obtain responce V(t).

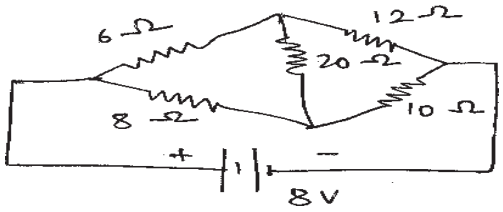
Q3) Solve any <u>four</u>. **[4 × 4 = 16]**

a) Design band elimination filter having design impedence 600 Ω and cutoff freq. f_1 = 4Hz and f_2 = 4Hz.

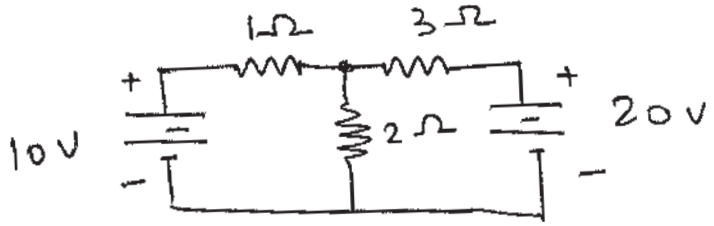
b) What is positive real function ? List the properties of positive real function and check

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

c) Find I and verify reciprocity theorem



d) Verify Tellegen's theorem.



e) Explain star-delta conversion theorem.

Q4) Solve any <u>two</u>. **[2 × 8 = 16]**

a) Determine any three realizations for

$$Z(s)=\frac{2(s+1)(s+3)}{(s+2)(s+6)}$$

b) Obtain Foster & Canses form

$$Z(s)=\frac{s^2+4s+3}{s^2+2s}$$

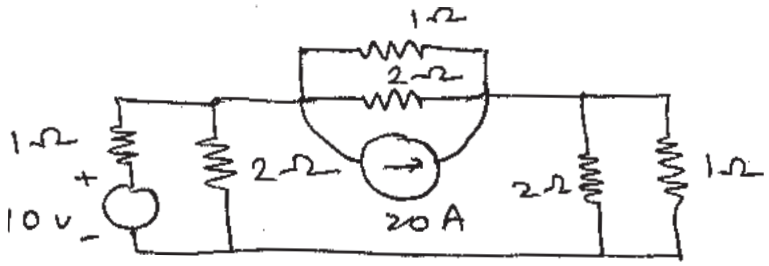
c) Define attenuator. Derive design equation for T-type attenuator and find attenuation of 50 d B to operate into line of resistance 600 Ω.

Q5) Solve any <u>two.</u> **[2 × 8 = 16]**

a) Find time domain responce for

$$Y(S)=\frac{10S}{[(s+5+j15)(s+5-j15)]}$$

b) With the cutset schedule solve the network.



c) Obtain inverse laplace transformation

i) $F(s) = \frac{1}{s(s+2)(s+1)2}$

ii) $F(s) = \frac{5s+40}{s(s^2+12s+27)}$

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Total No. of Questions : 5]

P794

[Total No. of Pages : 3

[4136] - 103
M.Sc.
ELECTRONIC SCIENCE
EL 1 UT 02 : optoelectronics
(2004 Pattern) (Sem. - I)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***

Q1) Answer any four. **[4 × 4 = 16]**

a) i) What is modal dispersion?

ii) Is it the same or different in different types of fibers? Justify your answer.

b) Describe the design considerations associated with the optical fiber communication system.

c) Explain role of NRZS fiber in communication system.

d) Explain with neat diagram, the fiber numerical aperture measurement using scanning photodetector and rotating stage.

e) State shell's law.

Explain concept of total internal reflection.

Q2) Answer any two. **[2 × 8 = 16]**

a) Draw block diagram of a digital transmission system with optical data link as signal path. State the advantages of fiber optic communication system over copper wire communication system.

P.T.O.

b) State different methods of manufacturing of optical fibers. Explain any one in detail.

c) State the general requirements for a source in optical fiber communication system. Discuss how injection lasers satisfy these requirements. Comment on the draw backs of using injection lasers as optical fiber communication source.

Q3) Answer any <u>four</u>. **[4 × 4 = 16]**

a) State applications of:

i) high power lasers

ii) low power continuous wave lasers

b) State the criteria that explain the important compatibility requirements for optical detectors in fiber optic communication system.

c) With neat diagram explain working of photomultiplier tube.

d) Describe intrinsic and extrinsic losses in optical fibers.

e) Explain role of DS fiber in communication system.

Q4) Answer any <u>four</u>. **[4 × 4 = 16]**

a) Explain the terms directionality and divergence of laser beam.

b) Draw diagram and explain working of photo electric cell.

c) Discuss role of strength of material in optical fiber cable.

d) Draw optical fiber system with basic components.

e) State fiber attenuation measurement techniques and explain any one in detail.

Q5) Answer any <u>two.</u> **[2 × 8 = 16]**

a) State different light sources used in optical experiment. What is monochromatic source of light? State the advantages and applications of monochromatic source.

b) Explain a typical experimental arrangement for the measurement of spectral loss in optical fibers using cut back technique.

c) Describe the processes by which light can be emitted from an atom. Discuss the requirement for population inversion in order that stimulated emission may dominate over spontaneous emission.

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Total No. of Questions : 5]

SEAT No. :

P795

[Total No. of Pages : 2

[4136] - 201

M.Sc.

ELECTRONIC SCIENCE

EL2 - UT04 : Applied Electromagnetics, RF and Microwave

(2008 Pattern) (Sem. - II)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat circuit/block diagram wherever necessary.***
4) ***Log-book/ Non programmable calculator is allowed.***

Q1) Attempt any two of the following: **[2 × 8 = 16]**

a) Deduce an expression for intrinsic impedance of a medium using Maxwell's equations. State the importance of intrinsic impedance of free space in wireless communication.

b) Elaborate smith chart with reference to mathematical formulation, Important characteristics and applications.

c) What are the different types of antenna parameters? Explain any four parameters in brief.

Q2) Attempt any two of the following: **[2 × 8 = 16]**

a) Describe the salient features of Horn Antenna. Why it is called Super Gain Antenna? Explain its construction and working in brief.

b) Explain with suitable examples, the electromagnetic effects in high speed digital system.

c) With the help of energy diagram, explain the operating principle of Tunnel Diode.

Q3) Attempt any four of the following. **[4 × 4 = 16]**

a) Write a short note on dielectric hysteresis with the help of Maxwell's equations.

b) Describe the different types of losses in microstrip lines.

c) What do you mean by retarded potential? Explain it in brief.

P.T.O.

d) With proper diagram, define rise time (T) and length of rising edge (L) for a typical logic gate. Estimate the length of rising edge (L) if the propogation delay (D) is 71 ps/cm. and the rising time (T) is 1.5 ns.

e) Explain cavity resonator in brief.

Q4) Attempt <u>any four</u> of the following: **[4 × 4 = 16]**

a) A uniform transmission line has the following constants,

$R = 12\,m\Omega\,m^{-1}$, G = 1.4 $\mu\mho\,m^{-1}$, L = 1.5 m Hm^{-1} and C = 1.4 nF m^{-1}.

At 7kHz, calculate characteristic impedance and attenuation in decibels per kilometer.

b) An air filled rectangular wave guide of inside dimensions 7 ×3.5cm operates in the dominant TE_{10} mode. Determine cutoff frequency. Calculate the phase velocity and guided wavelength at a frequency of 3.5 GHz.

c) Write a short note on patch antenna.

d) Describe double stub matching in brief.

e) Explain the absorption of microwave by atmosphere.

Q5) Attempt <u>any four</u> of the following: **[4 × 4 = 16]**

a) State Poynting Vector Theorem and explain its Physical significance.

b) Explain in brief the role of reflector in various types of antenna.

c) A certain GaAs MESFET has the following parameters;

$R_g = 3\ \Omega$, $R_i = 2.5\ \Omega$ gm = 50 milimhos

$R_d = 450\ \Omega$, $R_s = 2.5\ \Omega$ $C_{gs} = 0.60\ p^F$.

Calculate the cutoff frequency and maximum operating frequency of the device.

d) Write a short note on Wave guide Corners, Bends and twist.

e) Define microwave frequencies. Tabulate IEEE microwave Frequency bands for at least four frequency ranges.

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Total No. of Questions : 5]

SEAT No. :

P796

[Total No. of Pages : 2

[4136] - 202
M.Sc. (Sem. - II)
ELECTRONIC SCIENCE
EL02UT 05 : Communication Electronics
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***

Q1) Answer **any four** of the following. **[4 × 4 = 16]**

a) Write a sampling theorem and mention its importance in digital data communication.

b) With the help of block diagram, explain the working of superheterodyne receiver in short.

c) Explain the working of stagger tuned amplifier.

d) Describe any one code error detection and correction techniques in short.

e) Explain the working of local loop land line telephone system.

f) Describe any one type of digital subscriber line (DSL) in short.

Q2) Attempt **any two** of the following: **[2 × 8 = 16]**

a) i) Describe the equipment and atmospheric noise in short.

ii) List the transmission media and explain any one of them in detail.

b) i) With the help of diagram, explain SSB transmitter using filter method.

ii) Draw and explain the working of ratio or quadrature detector.

c) i) Write the working of cascade tuned amplifier in short.

ii) With the help of diagram, explain the function of neutralizing capacitor used in RF amplifier.

P.T.O.

Q3) Write **any four** of the following. **[4 × 4 = 16]**

a) Draw and explain the working of any one method of FM generator.

b) Write short note on RF integrated circuit amplifier.

c) With the help of block diagram, explain pulse code modulator in short.

d) Explain the working of quadrature amplitude modulator in short.

e) Describe the working of digital telephone exchange in short.

Q4) Answer **any two** of the following: **[2 × 8 = 16]**

a) Explain the basic format of SDLC and HDLC in detail.

b) What is ISDN? List the applications of if. Explain any two applications of ISDN in detail.

c) With the help of block diagram. Explain the working of delta and adaptive delta modulation. Write the advantages of adaptive over delta modulation.

Q5) Attempt **any four** of the following: **[4 × 4 = 16]**

a) Describe the role of limiter in FM receiver.

b) Write the difference between character oriented and bit oriented protocol.

c) Explain any one data compression techniques in detail.

d) With the help of block diagram explain the working of frequency shift keying modulator.

e) With the help of diagram, explain the working principle of phase shift keying.

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Total No. of Questions : 5]

SEAT No. :

P798

[Total No. of Pages : 2

[4136] - 301
M.Sc. (Sem. - III)
ELECTRONIC SCIENCE
EL3 UT 05 : Embedded Systems
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) Attempt any four of the following. **[4 × 4 = 16]**

a) Explain different components of embedded systems in short.

b) Write short note on RISC and CISC architecture.

c) Draw the block diagram of 8051 micro controller and explain it in short.

d) Write any four differentiating points between microprocessor and micro controller.

e) Describe any four logical instructions of 8051 microcontroller with suitable example.

Q2) Write any four of the following: **[4 × 4 = 16]**

a) Explain controller area network (CAN) in short.

b) Describe how PWM can be used in speed control of DC motor.

c) Draw the interfacing of 32 k × 8 data RAM with 8051 microcontroller. Write the memory map of system.

d) Write an assembly language / 'C' program to rotate a stepper motor anti clockwise continuously for 8051 microcontroller.

e) Describe the procedure to measure frequency using 8051 microcontroller.

P.T.O.

Q3) Answer any two of the following. **[2 × 8 = 16]**

a) With the help of suitable diagram, describe Integrated Development Environment (IDE) in detail.

b) Describe any two hardware tools used for embedded systems development in detail.

c) Write a 'C' program to display 8-bit hex counter on LCD for 8051 micro controller, Explain how it can be converted to two digit BCD counter.

Q4) Write any two of the following: **[2 × 8 = 16]**

a) i) Write an any four features of PIC microcontroller.

ii) Explain any four types of instructions with suitable example for PIC microcontroller.

b) Write a 'C' program for PIC microcontroller to output 55H and AAH alternatingly on port B. Use timer to generate delay.

c) Write a 'C' program for 8051 microcontroller to read ADC and output the result on LCD.

Q5) Attempt any two of the following: **[2 × 8 = 16]**

a) i) Describe interrupt structure of AVR microcontroller.

ii) Describe registers associated with ports of AVR microcontroller.

b) Write an assembly /'C' program to read 4 keys and display its status on LEDS for AVR microcontroller.

c) Draw an interfacing of relay to 8051 microcontroller and write a assembly / 'C' program to toggle relay with suitable delay using timer.

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Total No. of Questions : 5]

SEAT No. :

P799

[Total No. of Pages : 2

[4136] - 401

M.Sc.

ELECTRONIC SCIENCE

EL4 - UT06 : Control Systems : Theory and Applications

(2008 Pattern) (Sem. - IV)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) Answer any two of the following. **[2 × 8 = 16]**

a) With proper examples explain feedback control system and feed forward control system.

b) With suitable examples distinguish between.

i) Open loop system and closed loop system.

ii) Continuous control and discrete state process control.

c) i) A proportional controller is used for the control of temperature in the range 50°C - 130°C with a set point of 73.5°C. The zero error controller output is 50%. What will be the offset error resulting from a change in controller output to 55%. Proportional gain is 2% / %. Find the offset in °C.

ii) Sketch the outputs of P, PI, P_D and PID controllers for a step input.

Q2) Answer any two of the following: **[2 × 8 = 16]**

a) i) What is meant by relative stability of a control system?

ii) Transfer function of a system is given by

$$T(s)=\frac{(s+5)}{s(s+3)(s+4)(s^2+7s+12)}$$

Find poles, zeroes and characteristic equation. Sketch its pole-zero plot.

b) What is meant by process loop tuning? Explain Zeigler-Nichols method for the same.

P.T.O.

c) i) Explain how to construct Routh's array. How can it be used to analyse stability?

ii) Define the term root locus. Explain the essential conditions that every point on the root locus must satisfy.

Q3) Answer <u>any two</u> of the following. **[2 × 8 = 16]**

a) i) Explain canonical form of block diagram for a closed loop system. Derive its transfer function.

ii) Explain critical rules for block diagram reduction.

b) How is stability predicted from system Bode plots? Define gain and phase margins. How can they be adjusted?

c) i) Using Routh-Hurwitz criterian determine number of roots in left half of s-plane, right half of s-plane and those on imaginary axis for a system with characteristic equation.

$S^4 + 2S^2 + 1 = 0$

ii) Give event sequence for bottling plant control. Construct ladder diagram for it.

Q4) Answer <u>any two</u> of the following: **[2 × 8 = 16]**

a) Describe PLC system memory. How is PLC application memory organized into various files?

b) Explain PLC program sweep for a typical PLC.

c) i) Explain interfacing to non-Rs.232 PLC processors.

ii) A small electric furnace has two heating elements. When switched On first element starts and after 2 minutes second starts. A temperature sensor is used to shut down the furnace if overheating occurs. Draw ladder diagram for it.

Q5) Answer <u>any four</u> of the following: **[4 × 4 = 16]**

a) Describe what are local expansion and remote I/O expansion for a PLC.

b) Explain PLC countdown instruction [CTD].

c) Explain the masked move instruction [MVM].

d) Compare smart and dumb programming terminals.

e) Write a short note on indicators and alarms.

f) Explain the construction of a solenoid valve. What are its applications?

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