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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)
Electronics System design**

Day & Date: Monday, 13-02-2023
Time: 03:00 PM To 06:00 PM

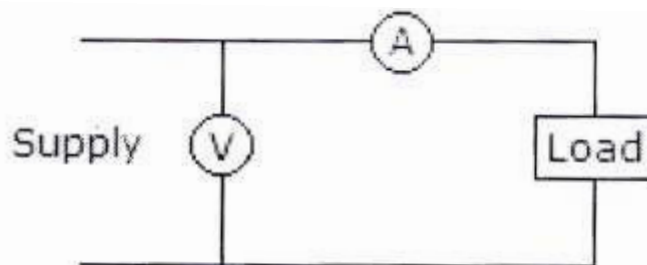
Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.

10

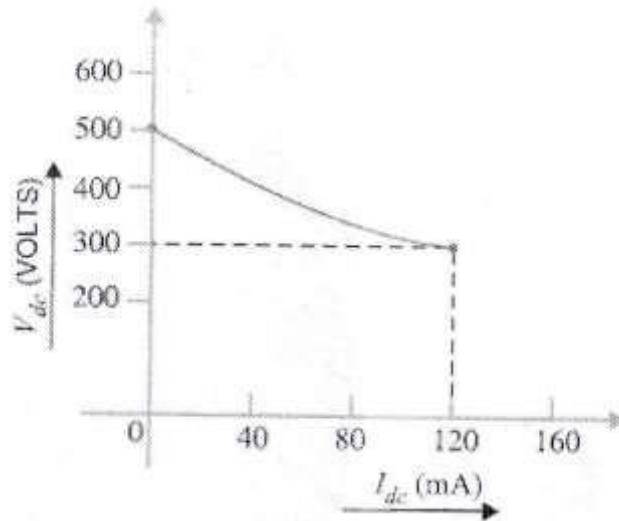
- 1) In figure, the position of voltmeter and ammeter are exchanged. It may result in damage to _____.



- a) Ammeter
b) Voltmeter
c) Both the instruments
d) Neither of two
- 2) Which of the following is a digital transducer?
a) Strain gauge
b) Encoder
c) Thermistor
d) LVDT
- 3) _____ transducer is the temperature transducer.
a) Thermocouples
b) RTD
c) Thermistor
d) All of the above
- 4) Active transducer used principle of _____.
a) energy conversion
b) energy translation
c) mass conversion
d) volume conversion
- 5) The total range of the transducer is _____.
a) Drift of the transducer
b) Span of the transducer
c) Precision of the transducer
d) None of the above
- 6) _____ circuit is used in thermistor signal conditioning
a) Wheatstone bridge
b) Kelvin bridge
c) Maxwell bridge
d) Wein bridge
- 7) Which of the following circuits is used in the signal conditioning?
a) Amplification
b) Isolation
c) Filtering
d) All of above
- 8) Zener diode is used as _____ regulator.
a) Series
b) Shunt
c) Can be used as series or shunt
d) None of above

- b) Fig. Below shows the regulation curve of a power supply. Find
- voltage regulation and
 - minimum load resistance.

08



- Q.7 a) Discuss the design process of DVM using 7107 IC. 08
- b) What are challenges in signal conditioning of resistive sensors? Explain in brief how one can achieve linearization in thermistor characteristics. 08

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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)
Network Analysis and Synthesis**

Day & Date: Tuesday, 14-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

- Q.1 A) Choose Correct Alternative. 10**
- 1) Which basic law should be followed to analyse the circuit?
 - a) Newton's law
 - b) Faraday's law
 - c) Amperes law
 - d) Kirchoff's law
 - 2) The algebraic sum of voltages around any closed path in a network is equal to
 - a) Infinity
 - b) 1
 - c) 0
 - d) Negative polarity
 - 3) In nodal analysis how many nodes are taken as reference nodes?
 - a) 1
 - b) 2
 - c) 3
 - d) 4
 - 4) A mesh is a loop which contains _____ number of loops within it.
 - a) 1
 - b) 2
 - c) 3
 - d) No loop
 - 5) Thevenin's theorem is true for _____.
 - a) Linear networks
 - b) Non-Linear networks
 - c) Both linear networks and nonlinear networks
 - d) Neither linear networks nor non-linear networks
 - 6) Resonance frequency occurs when _____.
 - a) $X_L = X_C$
 - b) $X_L > X_C$
 - c) $X_L < X_C$
 - d) Cannot be determined
 - 7) The maximum power is delivered to a circuit when source resistance is _____ load resistance.
 - a) Greater than
 - b) Equal to
 - c) Less than
 - d) Greater than or equal to
 - 8) The roots of the odd and even parts of a Hurwitz polynomial P (s) lie on _____.
 - a) right half of s plane
 - b) left half of s-plane
 - c) on $j\omega$ axis
 - d) on σ axis
 - 9) The unit step is not defined at t =?
 - a) 0
 - b) 1
 - c) 2
 - d) 3

- 10) The circuit in which current has a complete path to flow is called _____ circuit.
 a) short
 c) closed
- b) open
 d) open loop

B) Write True or False.**06**

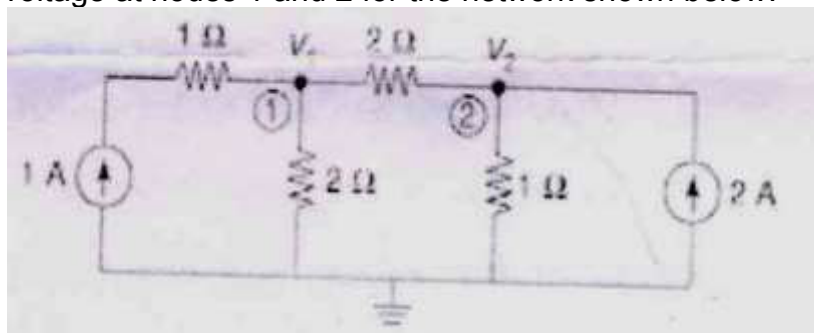
- 1) Tellegen's Theorem is valid for linear network only.
- 2) Laplace transform changes the time domain function to the frequency domain function.
- 3) Initial conditions in a network are used to find the value of arbitrary constants.
- 4) In series combination, the same current flows through each element.
- 5) In series resonance, inductance behaves like a straight line passing through origin
- 6) Laplace transform of unit step function is 1.

Q.2 Answer the following.**16**

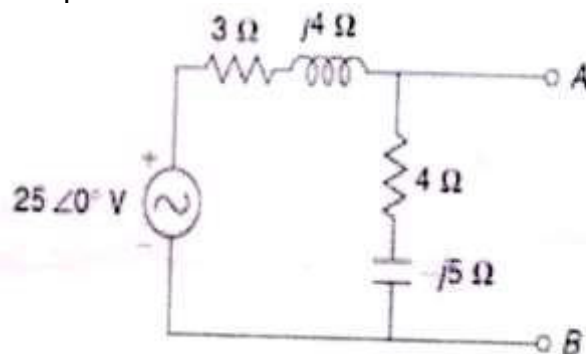
- a) Explain the time scaling property of Laplace Transform.
- b) Explain the properties of Hurwitz polynomials.
- c) Write a note on impedance of series resonance circuit.
- d) Explain the series combination of resistors.

Q.3 a) What is waveform synthesis? Obtain the Laplace transform of following**10**

- 1) Unit Step
- 2) Shifted Unit Step

b) Find the voltage at nodes 1 and 2 for the network shown below.**06****Q.4 Answer the following.**

- a) Obtain Norton's equivalent network between terminals A and B.

08

- b) Determine the quality factor of the following:

08

- 1) For Inductor
- 2) For Capacitor

- Q.5** a) Describe following parameters of parallel resonant circuit. **10**
1) Variation of impedance with frequency
2) Reactance Curve
- b) Test whether the given polynomial $P(s) = s^4 + 7s^3 + 6s^2 + 21s + 8$ is Hurwitz by routh array. **06**
- Q.6** a) Describe the open circuit impedance parameters in detail. **08**
b) Discuss about driving point synthesis in detail. **08**
- Q.7** a) What is Hurwitz Polynomial? State for each case, whether the polynomial is Hurwitz or not. Give reason in each case. **08**
1) $s^4 + 4s^3 + 3s + 2$
2) $s^6 + 5s^5 + 4s^4 - 3s^3 + 2s^2 + s + 3$
- b) Explain in detail initial conditions of a network. **08**

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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)
Signals and Systems**

Day & Date: Wednesday, 15-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

- Q.1 A) Choose Correct Alternative. 10**
- 1) Time scaling is an operation performed on _____.
 - a) Dependent variable
 - b) Independent variable
 - c) Both dependent and independent variable
 - d) Neither dependent nor independent variable
 - 2) $Y(t) = x(2t)$ is _____.
 - a) Compressed signal
 - b) Expanded signal
 - c) Shifted signal
 - d) Amplitude scaled signal by a factor of 2
 - 3) A system produces zero output for one input and same gives the same output for several other inputs. What is the system called?

a) Non - invertible System	b) Invertible system
c) Non - causal system	d) Causal system
 - 4) The general form of real exponential signal is _____.

a) $X(t) = be^{at}$	b) $X(t) = (b + 1)e^{at}$
c) $X(t) = b(at)$	d) $X(t) = be^{(a+1)t}$
 - 5) The type of systems which are characterized by input and the output capable of taking any value in a particular set of values are called as _____.

a) analog	b) discrete
c) digital	d) continuous
 - 6) A system is said to be defined as non-causal, when
 - a) the output at the present depends on the input at an earlier time
 - b) the output at the present does not depend on the factor of time at all
 - c) the output at the present depends on the input at the current time
 - d) the output at the present depends on the input at a time instant in the future
 - 7) A signal is a physical quantity which does not vary with _____.

a) Time	b) Space
c) Independent Variables	d) Dependent Variables
 - 8) If $x(-t) = -x(t)$ then the signal is said to be _____.

a) Even signal	b) Odd signal
c) Periodic signal	d) Non periodic signal

- 9) The impulse function is denoted by _____.
 a) $u(t)$ b) $\delta(t)$
 c) $u(t)$ or $\delta(t)$ d) None of the above
- 10) Whenever the amplitude of step function is equivalent to one then that is _____ signal
 a) Unit b) Step
 c) Impulse d) None of the above

B) Write True or false.

06

- 1) When $t \geq 0$, the unit signal amplitude must be Infinity.
- 2) The impulse function is one when $t=0$.
- 3) The discrete-time always indicated with n .
- 4) There are two types of Fourier series.
- 5) Laplace transform is only for a continuous-time.
- 6) Linear system satisfies the superposition principle.

Q.2 Answer the following.

16

- 1) Define periodic and non-periodic signals.
- 2) Define energy and power signals.
- 3) Define Fourier Transform & Explain
- 4) Define Laplace Transform & Explain

Q.3 a) Explain types of Continuous time signals with diagrams.

10

b) Explain types of modification of independent variable(time)

06

Q.4 a) Draw the following sequences:

10

- 1) Impulse Sequence
- 2) Unit step sequence
- 3) Unit ramp sequence
- 4) Sinusoidal sequence
- 5) Real exponential sequence

b) Explain even and odd signals with help of examples.

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Q.5 a) Discuss the classification Continuous Time systems with examples.

10

b) Explain Linear Time Invariant (LTI) systems.

06

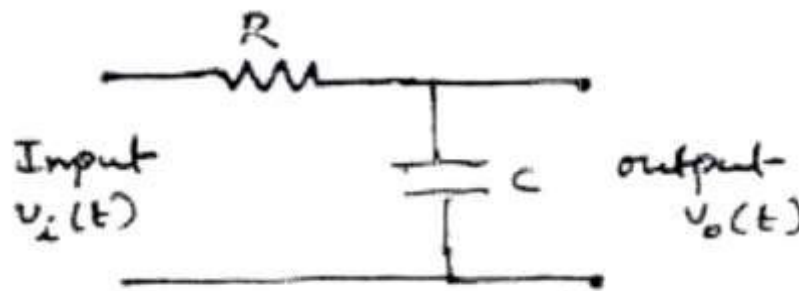
Q.6 a) Define Convolution. Explain properties of continuous convolution.

10

- 1) Commutative
- 2) Associative
- 3) Distributive

b) Find the impulse response of system.

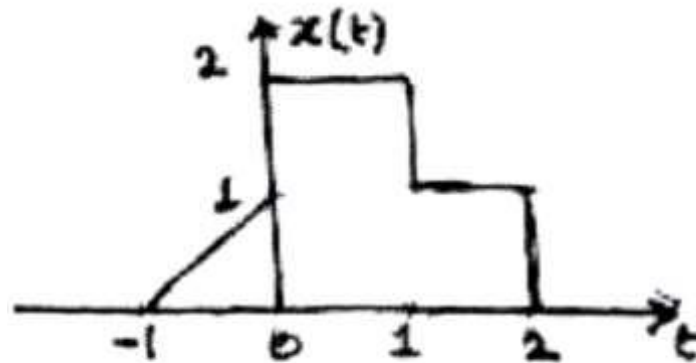
06



Q.7 a) State and prove properties of Discrete time fourier transform. 10

b) For the signal shown, Find 06

- 1) $x(2t + 3)$
- 2) $x(t - 2)$
- 3) $x(2 - t/3)$



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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)
Microcontrollers and Interfacing**

Day & Date: Thursday, 16-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.

10

- 1) _____ instruction is applicable to set any bit while performing bitwise operation settings.
 - a) bcf
 - b) bsf
 - c) Both a & b
 - d) None of the above
- 2) _____ flags are more likely to get affected in status registers by ALU of microcontroller on the basis of instructions execution.
 - a) Carry(C)
 - b) Zero(Z)
 - c) Digit Carry (DC)
 - d) All of the above
- 3) _____ on MCLR (master clear) pin allows to reset the PIC.
 - a) Low
 - b) High
 - c) Moderate
 - d) All of the above
- 4) The instruction set of PIC microcontroller consists of just _____ instructions.
 - a) 111
 - b) 100
 - c) 35
 - d) 53
- 5) The Timer1 module is a _____ bit timer/counter.
 - a) 8
 - b) 4
 - c) 2
 - d) 16
- 6) _____ supported by CCP modules corresponding to time in PIC 16F877.
 - a) Control
 - b) Measurement
 - c) Generation of pulse signal
 - d) All of the above
- 7) The functionalities associated with the pins RAO- RA3 in ADCON1 are manipulated by _____.
 - a) PCFG1 & PCG0
 - b) VREF
 - c) ADON
 - d) All of the above
- 8) The PIC 16F877A available in _____ package.
 - a) 44-Pin PLCC
 - b) 44-Pin TQFP
 - c) 40-Pin PDIP
 - d) All of above
- 9) PORTA of PIC 16F877A is a _____ bit wide.
 - a) 6
 - b) 4
 - c) 8
 - d) 3
- 10) The PIC 16F87XA devices have a _____ bit program counter.
 - a) 6
 - b) 13
 - c) 8
 - d) 16

- B) Fill in the blanks or write True or False** **06**
- 1) PIC 16F877A have 256 bytes of data EEPROM.
 - 2) Setting a TRISA bit = 1 will make the corresponding PORTA pin an input.
 - 3) Flash Program Memory is 128K wide.
 - 4) The Timer1 module can be configured as 16 bit timer/counter.
 - 5) DECF means the contents of register 'f' are decremented by 2.
 - 6) PIC 16F877A has 8 channels of 12 bit Analog-to-Digital (A/D) converter.
- Q.2 Answer the following.** **16**
- a) What are the addressing modes of PIC microcontroller?
 - b) List the function of I/O ports in PIC.
 - c) Draw 40- pin diagram of PIC Microcontroller.
 - d) Write a short note on PWM in CCP module
- Q.3**
- a) With diagram explain 7-segment interfacing with PIC Microcontroller to display 0 to 9 with C program. **10**
 - b) Write the features of PIC Microcontroller. **06**
- Q.4**
- a) Explain how to interface push button with PIC microcontroller with C program **08**
 - b) Explain ADC module and its registers in PIC Microcontroller. **08**
- Q.5**
- a) Explain the speed control of DC motor using PIC micro controller with suitable diagram. **08**
 - b) Describe the timer 1 module of PIC 16F877A. **08**
- Q.6**
- a) Draw an internal architecture diagram of PIC Microcontroller. Explain each block in detail. **10**
 - b) Write a short note on oscillator and clock of PIC microcontroller. **06**
- Q.7**
- a) Explain in detail about the compare and capture mode of the PIC micro controller with a neat diagram **08**
 - b) What is the importance of Interrupt? Explain the interrupt structure of PIC microcontroller with neat diagram. **08**

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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONIC SCIENCE)
Control Systems**

Day & Date: Monday, 20-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

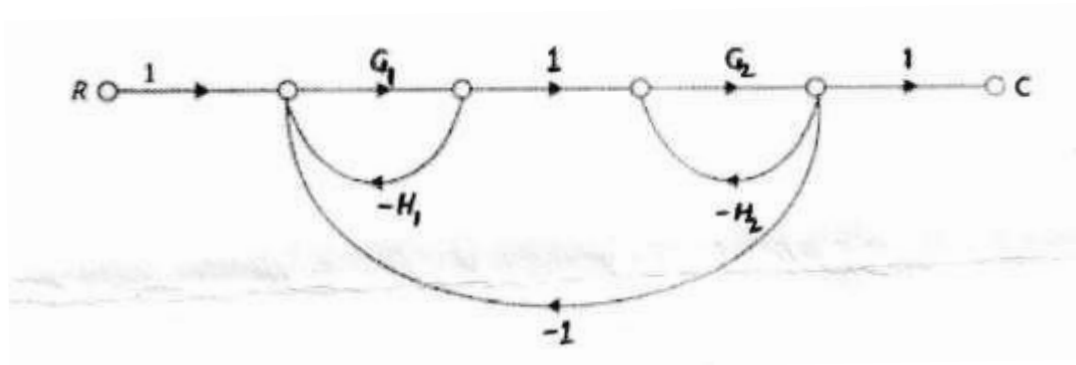
- Instructions:** 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct answer. 10

- 1) Routh Hurwitz criterion provides _____.
 - a) roots in left half of s plane.
 - b) roots in right half of s plane and roots on imaginary axis.
 - c) roots in left half of s plane and roots on imaginary axis.
 - d) roots in right half of s plane.
- 2) The initial response when the output is not equal to input is called _____.
 - a) Error response
 - b) Dynamic response
 - c) Transient response
 - d) Either of the above
- 3) Peak overshoot of step-input response of an underdamped second order system is explicitly indicative of _____.
 - a) settling time
 - b) rise time
 - c) natural frequency
 - d) damping ratio
- 4) _____ is increases with the feedback in control system?
 - a) Sensitivity
 - b) Gain
 - c) Effects of disturbing signal
 - d) System stability
- 5) Transfer function of the control system depends on _____.
 - a) initial conditions of input and output
 - b) only system parameters
 - c) nature of the output
 - d) nature of the input
- 6) In _____ system the control action is independent of the output.
 - a) closed loop system
 - b) open loop system
 - c) partially closed
 - d) partially open
- 7) The impulse response of a LTI system is a unit step function, then the corresponding transfer function is _____.
 - a) $1/s$
 - b) 0
 - c) 1
 - d) s
- 8) Electrical time-constant of an armature-controlled dc servomotor is _____.
 - a) equal to mechanical time constant
 - b) smaller than mechanical time constant
 - c) larger than mechanical time constant
 - d) not related to mechanical time constant

Q.5 Answer the following.

A) Find the gain of the system represented by the following signal flow graph. **08**



B) Using Routh's criterion check the stability of a system whose characteristic equation is given by $s^6 + s^5 - 2s^4 - 3s^3 - 7s^2 - 4s - 4 = 0$ **08**

Q.6 Answer the following.

A) What is Bode plot? Explain gain margin and phase margin. What are rules for drawing Bode plots. **10**

B) Draw the bode diagram for the following transfer function. **06**

Q.7 Answer the following.

A) Explain the PI control action and list advantages and disadvantages. **08**

B) Describe lead lag compensator network in brief. **08**

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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov - 2022
(ELECTRONIC SCIENCE)
Digital Signal Processing**

Day & Date: Tuesday, 21-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicates full marks.

Q.1 A) Choose the correct option. 10

- 1) What is the set of all values of z for which $X(z)$ attains a finite value?
 - a) Radius of convergence
 - b) Radius of divergence
 - c) Feasible solution
 - d) None of the mentioned
- 2) What is the ROC of the signal $x(n) = \delta(n - k), k > 0$?
 - a) $z = 0$
 - b) $z = \infty$
 - c) Entire z -plane, except at $z=0$
 - d) Entire z -plane, except at $z=\infty$
- 3) What is the z -transform of the finite duration signal $x(n) = \{2,4,5,7,0,1\}$?
 - a) $2 + 4z + 5z^2 + 7z^3 + z^4$
 - b) $2 + 4z + 5z^2 + 7z^3 + z^5$
 - c) $2 + 4z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$
 - d) $2z^2 + 4z + 5 + 7z^{-1} + z^{-3}$
- 4) What is the linear convolution of the sequences $x_1(n) = \{2,1,2,1\}$ and $x_2(n) = \{1,1,1,1\}$?
 - a) $\{2,3,5,6,2,3,5\}$
 - b) $\{2,3,5,6,4,3,1\}$
 - c) $\{6,6,6,6\}$
 - d) $\{1,3,4,6,5,3,2\}$
- 5) How many complex multiplications are need to be performed for each FFT algorithm?
 - a) $(N/2)\log_2 N$
 - b) $N\log_2 N$
 - c) $(N/2)\log_2 N$
 - d) None of the mentioned
- 6) The system described by the input-output equation $y(n)=nx(n)-bx (n^2)$ is a _____.
 - a) Static system
 - b) Dynamic system
 - c) Identical system
 - d) None of the mentioned
- 7) In IIR Filter design by the Bilinear Transformation, the Bilinear Transformation is a mapping from _____.
 - a) Z -plane to S -plane
 - b) S -plane to Z -plane
 - c) S -plane to J -plane
 - d) J -plane to Z -plane
- 8) What is the impulse response of the system described by the second order difference equation $y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$?
 - a) $[-1/5 (-1)^n - 6/5 (4)^n]u(n)$
 - b) $[-1/5 (-1)^n - 6/5 (4)^n]u(n)$
 - c) $[-1/5 (-1)^n + 6/5 (4)^n]u(n)$
 - d) $[-1/5 (-1)^n + 6/5 (4)^n]u(n)$
- 9) What is the DFT of the four point sequence $x(n) = \{1,2,3,4\}$?
 - a) $\{10, -2+2j, -2, -2-2j\}$
 - b) $\{10, -2-2j, 2, -2+2j\}$
 - c) $\{10, -2+2j, 2, -2-2j\}$
 - d) $\{10, -2-2j, -2, -2+2j\}$

- 10) If $W_4^{100} = W_x^{200}$, then what is the value of x ?
- a) 2
 - b) 4
 - c) 8
 - d) 16

B) Write TRUE or FALSE

06

- a) The direct form realization is often called a transversal or tapped-delay-line filter.
- b) The odd part of a signal $x(t)$ is given by $(1/2)*(x(t)+x(-t))$
- c) If a signal $x(n)$ is passed through a system to get an output signal of $y(n)=x(n+1)$, then the signal is said to be advanced signal.
- d) If $x(n)$ and $X(k)$ are an N -point DFT pair, then $x(n+N)=x(n)$.
- e) If all the poles of $H(z)$ are outside the unit circle, then the system is said to be stable.
- f) The oscillatory behavior near the band edge of the low pass filter is known as Gibbs phenomenon.

Q.2 Answer the following.

16

- a) State the properties of z-transform.
- b) Prove the time shifting property of DFT.
- c) Draw the linear phase structure for the function

$$H(Z) = 1 + 5Z^{-1} + 3Z^{-2} + 5Z^{-3} + Z^{-4}$$
- d) Verify the given system is causal or not? $y(n) = a.x(n) + b$

Q.3 Answer the following.

- a) Find convolution using overlap add method for
 $x(n) = \{1,2, -1,2,3, -2, -3, -1,1,1,2, -1\}$ and $h(n) = \{1,2,1\}$
- b) Draw the direct form I and II structure for the system given by
 $y(n) + y(n - 1) - 4y(n - 3) = x(n) + 3x(n - 2)$

08

08

Q.4 Answer the following.

- a) Find circular convolution of $x(n) = \{1,2,2,1\}$ and $h(n) = \{3,2,1,3\}$
- b) Perform following operation on the signal given below

08

08



- 1) $x(3 - t)$
- 2) $x(t/3)$
- 3) $x(2t). [u(t) - u(t - 1)]$
- 4) $2 x(t + 2)$

Q.5 Answer the following.

- a) Find 8 point DFT of $x(n) = \{2,2,2,2,1,1,1,1\}$ using radix-2 DIT FFT algorithm.
- b) Find linear convolution using circular convolution of the sequences
 $x(n) = \{1,2,3,1\}$ and $h(n) = \{1, -1,1\}$

08

08

Q.6 Answer the following.

- a) Design an ideal low pass filter with a frequency response

$$H_d(e^{jw}) = 1 \quad \text{for } -\pi/4 \leq w \leq \pi/4$$

$$= 0 \quad \text{for } \pi/4 \leq |w| \leq 4$$

10

Find the values for $h(n)$ for $N = 9$

- b) Using bilinear transformation obtain $H(Z)$ if

06

$H(S) = \frac{1}{(S+1)^2}$ and $T = 0.1$ s

Q.7 Answer the following.

- a)** Find 8-point DFT using DIF-FFT algorithm for the given sequence **08**
 $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$
- b)** Find inverse z-transform of **08**
 $X(z) = \frac{1}{1 - 0.8z^{-1} + 0.12z^{-2}}$ if ROC is $|z| > 0.6$

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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)**

Advance Microcontrollers and Protocols

Day & Date: Wednesday, 22-02-2023
Time: 11:00 AM TO 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. 10

- 1) Which of the following have an asynchronous data transmission?
 - a) SPI
 - b) RS232
 - c) Parallel port
 - d) I2C
- 2) Thumb has _____ code density
 - a) Higher
 - b) Lower
 - c) Medium
 - d) None
- 3) AMBA bus was introduced in the year of _____.
 - a) 1996
 - b) 2000
 - c) 1998
 - d) 1990
- 4) The RS232 is also known as _____.
 - a) UART
 - b) SPI
 - c) Physical interface
 - d) Electrical interface
- 5) _____ is placed between main memory and core.
 - a) Cache
 - b) RAM
 - c) ROM
 - d) All
- 6) 10 ARM stands for _____.
 - a) Advanced Rise Machine
 - b) Advanced Rise Microprocessor
 - c) Advanced Rise Microcontroller
 - d) None of above
- 7) ARM is _____ bit Microcontroller.
 - a) 8
 - b) 16
 - c) 32
 - d) 64
- 8) Barrel shifter is used for _____.
 - a) Shifting data
 - b) Inversing data
 - c) Reversing data
 - d) None of above
- 9) BX stands for _____.
 - a) Branch with exchange
 - b) Branch with Exclusive
 - c) Branch
 - d) None of the above
- 10) ARM supports _____ types of exception.
 - a) 5
 - b) 4
 - c) 3
 - d) 2

- B) Write True or false** **06**
- 1) All instructions in ARM are conditionally executed.
 - 2) ARM uses 35 registers set.
 - 3) Keil-5 is IDE used for Embedded device programming.
 - 4) ARM has 6 processing modes.
 - 5) Instruction size in CISC processor is fixed.
 - 6) ARM7 has an in-built debugging device
- Q.2 Answer the following.** **16**
- 1) Explain RISC.
 - 2) Explain functional block diagram of ARM processor.
 - 3) Explain Program Status Register in ARM processor.
 - 4) Differentiate ARM and Thumb instruction set features.
- Q.3** a) Explain processor modes in ARM **10**
b) Explain memory mapped I/O in ARM processor **06**
- Q.4** a) Explain pipeline feature in ARM 7. **08**
b) Explain features of Cortex -M3 processor **08**
- Q.5** a) Explain five thumb instructions in ARM **10**
b) Briefly Explain IDE Cube-MX **06**
- Q.6** a) Explain five instructions with syntax of ARM instruction set. **10**
b) What is I2C? Explain I2C operations. **06**
- Q.7** a) Write a program for LED interfacing using Embedded C for ARM processor. **08**
b) How messaging can be done using CAN protocol? **08**

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M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
ELECTRONICS SCIENCE
Process Control

Day & Date: Monday, 13-02-2022
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
 2) Attempt any Three from Q.3 to Q.7
 3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. 10

- 1) Main objective of process control is _____.
 - a) to control physical parameters
 - b) to control mechanical parameters
 - c) to control optical parameters
 - d) to control electrical parameters
- 2) The standard for long distance analog signal transmission in process control industry is _____.
 - a) 4-20 mA
 - b) 0-20 mA
 - c) 10-20 mA
 - d) 20-40 mA
- 3) The term hysteresis is associated with _____.
 - a) P-control
 - b) I-control
 - c) ON-OFF control
 - d) D-control
- 4) Feed forward controller accounts for the _____ changes.
 - a) Set point
 - b) Load
 - c) Both a & b
 - d) Neither a nor b
- 5) A system with transfer function $[(2S/4S) + 1]$ is of _____ order.
 - a) 2nd
 - b) 3rd
 - c) 1st
 - d) 4th
- 6) The key advantage of PI controller is that it eliminates the _____.
 - a) reference signal
 - b) Offset
 - c) actuating signal
 - d) Control signal
- 7) Physical parameters change due to _____.
 - a) Voltage
 - b) Current
 - c) internal and external disturbances
 - d) Power
- 8) In a stable control system backlash can cause due to _____.
 - a) over damping
 - b) low-level oscillations
 - c) under damping
 - d) Poor stability at reduced values of open loop gain
- 9) Temperature control system is known as _____.
 - a) Servomechanism
 - b) Process control system
 - c) Cascade control system
 - d) None of the above

- 10) A process control system consists of _____.
- a) 10 elements
 - b) 6 elements
 - c) 2 elements
 - d) 4 elements

B) Fill in blanks or write True or false 06

- 1) Feedback path element measure only input parameters.
- 2) Standard for long distance analog (voltage) signal transmission in process control industry' is 1-5V.
- 3) Oscillator element is not used in an automatic control system.
- 4) The bandwidth for a good control system is very small.
- 5) Feedback control may introduce instability in a closed loop system.
- 6) In a control system the output of the controller is given to sensor.

Q.2 Answer the following. 16

- 1) Compare SLPC and MLPC.
- 2) What is only-P controller? Write equation for its output.
- 3) Compare Feed forward and Feedback control.
- 4) Explain self regulating Process

Q.3 a) Explain Proportional Derivative (PD) controller and write transfer function with second order system. 10

b) With a neat diagram explain the elements of process control. 06

Q.4 a) With the help of neat sketch illustrate the pressure control loop diagram. 08

b) Write a short note on non-linear elements in control loop. 08

Q.5 a) Explain Ziegler-Nichols tuning method for process loop tuning. 08

b) Explain Cohen-coon method with example in detail. 08

Q.6 a) Explain the different types of scaling. 10

b) What do you mean by the term Backlash? How can it be removed? 06

Q.7 a) Find solution for the following fuzzy relational operation 08

i) $R \cup \bar{R}$

ii) $R \cap \bar{R}$

R is given $\begin{vmatrix} 0.2 & 0.5 & 0.2 \\ 0.5 & 0.6 & 0.7 \\ 0.7 & 0.1 & 0.3 \end{vmatrix}$

b) Explain the classification of Artificial Neural Network. 08

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**M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)**

Microwave Devices and Applications

Day & Date: Tuesday, 14-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. 10

- 1) The number of semiconductor layers in a TRAPATT diode is:
 - a) Two
 - b) Three
 - c) Four
 - d) One
- 2) LSA full form is _____.
 - a) light space charge accumulation
 - b) light space charge atom
 - c) limited space charge accumulation
 - d) limited space charge atom
- 3) The first MESFET was developed in _____.
 - a) 1955
 - b) 1966
 - c) 1977
 - d) 1988
- 4) Which of the following is a microwave source with a cross field Theory?
 - a) TWT
 - b) Reflex Klystron
 - c) Double cavity klystron
 - d) Magnetron
- 5) Method used for fabrication of GaAs is _____.
 - a) Ion implantation
 - b) Diffusion
 - c) Deposition
 - d) Conduction
- 6) The curve of I_{DS} V/S V_{DS} of an FET _____ with the gate to source voltage applied channel.
 - a) constant
 - b) vary
 - c) does not vary
 - d) None of the above
- 7) The gain bandwidth product of Gunn diode is around _____ decibels?
 - a) Less than 10 dB
 - b) Greater than 200 dB
 - c) greater than 10 dB
 - d) infinite dB
- 8) In which of the following diode, depletion region will not form?
 - a) PN junction diode
 - b) PIN diode
 - c) Gunn diode
 - d) None
- 9) What is the standard form of TRAPATT?
 - a) Trapped Plasma Avalanche Transit Time
 - b) Trapped Plasma Avalanche Time
 - c) Trapped Plasma Avalanche Transit
 - d) none of the above
- 10) Which is not Microwave device?
 - a) Integrated Circuit
 - b) Light Emitting diode
 - c) Transistor
 - d) Varactor diode

- B) Fill in blanks or write True or False** **06**
- 1) The semiconductor layers in IMPATT diode are four.
 - 2) Advantage of Schottky diode over silicon crystal diode is the presence minority charge carriers.
 - 3) The operating range of the IMPATT diode lies in the range of 3 to 100 GHz.
 - 4) A tunnel diode is a p-n junction diode with a doping profile that allows electron tunneling through a narrow energy band gap.
 - 5) GUNN diodes LSA mode full form is light space charge accumulation.
 - 6) The material used to fabricate IMPATT diodes is GaAs since they have the highest efficiency in all aspects.
- Q.2 Answer the following.** **16**
- a) Explain different working region of microwave BJT.
 - b) Describe Ridley- Watkins- Hilsum theory in short.
 - c) Explain in short LSA mode of Gunn diode.
 - d) Compare BJT and JFET.
- Q.3** a) What is standard form of IMPATT? With neat diagram explain the construction and working of it and derive power and efficiency of the same? **10**
- b) Discuss different biasing techniques used for microwave bipolar transistor? **06**
- Q.4** a) What is TRAPATT diode? Explain elaborately their principle of operation with neat diagram. **08**
- b) Explain Heterojunction Bipolar Transistors. **08**
- Q.5** a) What is the operating principle of tunnel diode? Explain the working of its in detail. **08**
- b) What is Gunn Effect? Explain INP Gunn diode in detail. **08**
- Q.6** a) Explain in brief construction, working and principle of two valley modal theory of Gunn diode. **08**
- b) What is MOSFET? Explain MOSFET in detail with schematic diagram. **08**
- Q.7** a) What are the cross field devices? Explain the working of Cylindrical Magnetron oscillator. **08**
- b) Describe the various modes of operation of Reflex klystron. **08**

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**M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS SCIENCE)
Embedded System Design**

Day & Date: Wednesday, 15-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

- Q.1 A) Choose Correct Alternative. 10**
- 1) ARM stands for _____.
 - a) Advanced Rate Machines
 - b) Advanced RISC Machines
 - c) Artificial Running Machines
 - d) Aviary Running Machines
 - 2) The address space in ARM is _____.
 - a) 2^{24}
 - b) 2^{64}
 - c) 2^{16}
 - d) 2^{32}
 - 3) RISC stands for _____.
 - a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
 - 4) Each instruction in ARM machines is encoded into _____ Word.
 - a) 2 byte
 - b) 3 byte
 - c) 4 byte
 - d) 8 byte
 - 5) In the ARM, PC is implemented using _____.
 - a) Caches
 - b) Heaps
 - c) General purpose register
 - d) Stack
 - 6) The additional duplicate register used in ARM machines are called as _____.
 - a) Copied-registers
 - b) Banked registers
 - c) Extra registers
 - d) External registers
 - 7) The ability to shift or rotate in the same instruction along with other operation is performed with the help of _____.
 - a) Switching circuit
 - b) Barrel switcher circuit
 - c) Integrated Switching circuit
 - d) Multiplexer circuit
 - 8) How many operating modes does ARM have?
 - a) 4
 - b) 7
 - c) 37
 - d) 6
 - 9) I2C means _____.
 - a) Inter inter circuit
 - b) Internal internal circuit
 - c) Inter internal clock
 - d) Inter intergrated circuit
 - 10) Which one of the following is a real time operating system?
 - a) RT Linux
 - b) VxWorks
 - c) Windows CE
 - d) All of the mentioned

- B) Write True OR False. 06**
- 1) All instructions in ARM are conditionally executed.
 - 2) ARM uses 35 registers set.
 - 3) RTOS has both HARD & SOFT real time
 - 4) Binary Semaphore is one type of Semaphore
 - 5) Hard real time operating system has less jitter than a soft real time operating system.
 - 6) ARM7 has an in-built debugging device
- Q.2 Answer the following. 16**
- a) Explain RISC design philosophy.
 - b) Explain Von Neumann Architecture with suitable diagram.
 - c) Explain flags in ARM processor.
 - d) Explain communication protocol I2C.
- Q.3 a) Explain block diagram of ARM core dataflow model. 10**
b) Explain Architecture of kernel. 06
- Q.4 a) Explain pipeline feature in ARM 7. 08**
b) Explain functions of real time operating systems. 08
- Q.5 a) Explain five instructions from Data processing instruction group in ARM. 10**
b) What are message, queues, signals and pipes in RTOS? 06
- Q.6 a) Explain five logical instructions ARM instruction set. 10**
b) Explain difference in services between RTOS and traditional OS. 06
- Q.7 a) What is need of Interface techniques? Explain types of interface techniques. 08**
b) Explain task scheduler and Interrupt Service Routine (ISR).s 08