

Seat No.	
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M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Electronics System design (MSC02101)

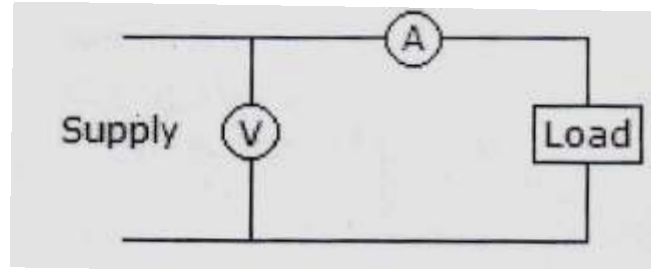
Day & Date: Wednesday, 19-07-2023
 Time: 03:00 PM To 06:00 PM

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) Select the correct answer.**10**

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



- a) Both the instruments b) Ammeter
 c) Voltmeter d) neither of two
- 2) LVDT is an/a _____ transducer.
 a) Magneto-strict ion b) Inductive
 c) Resistive d) Eddy current
- 3) The resistance of LDR _____ when exposed to radiant energy.
 a) Remains unaltered b) Increases
 c) Reaches maximum d) Decreases
- 4) Temperature coefficient of the thermistor is _____.
 a) Positive
 b) Negative or positive depends on type
 c) It depends on environment
 d) Decreases with decrease in temperature
- 5) Analog signals are digitized using _____.
 a) an amplifier and A/D converter b) Oscillator
 c) A/D converter d) D/A converter
- 6) In a Digital system Multiplexers are used _____.
 a) To accepts the single o/p b) To accept multiple i/p
 c) To accept multiple o/p d) To accept single input
- 7) LDR is abbreviated as _____.
 a) Light detected resistor b) Luminous dependent resistor
 c) Light determinant resistor d) Light Dependent resistor
- 8) Piezoelectric transducer consists of _____.
 a) copper rod b) aluminum wire
 c) gold crystal d) quartz crystal

- 9) Which one of the following is the example of linear regulator _____.
 a) transistor series regulator b) SMP
 c) step down converter d) all the of above
- 10) In Astable multivibrator both states are _____.
 a) unstable b) one state is stable
 c) both state stable d) none of the above

B) State true or false.

06

- 1) The response of a thermistor over the whole of its temperatures range is linear.
- 2) A capacitance transducer can be used to measure displacement.
- 3) LVDT is not the displacement transducer.
- 4) Signal conditioner should provide good isolation.
- 5) AC signal conditioning is not used for Capacitive transducer.
- 6) The main function of a signal conditioner is to pick up the signal and convert it into a higher level of electrical signal.

Q.2 Answer the following.

16

- a) With neat diagram explain Zener shunt regulator.
- b) Draw the circuit diagram of $\pm 5V$ power supply using IC 7805 and 7905.
- c) Draw the block diagram of thermocouple signal conditioning circuit.
- d) Discuss in brief TTL CMOS interface.

Q.3 a) What is sensor? What are types of sensors? Compare sensor and transducer.

08

- b) With neat labelled diagram explain the working of LVDT.

08

Q.4 Answer the following.

- a) Design the 8:1 MUX using 2:1 MUX. Is strobe required for the circuit if yes give its truth table.
- b) Explain design of full adder with suitable example.

10

06

Q.5 a) Explain the construction and working of thermocouple.

08

- b) Write short notes on the following.

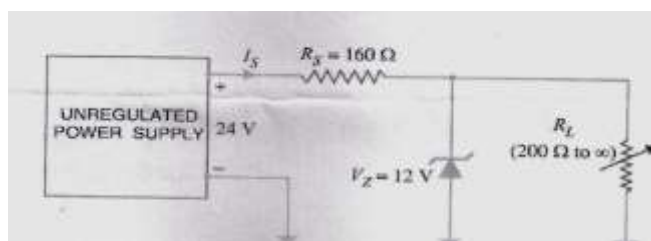
08

- i) Pressure sensor
- ii) Thermistor

Q.6 a) Fig. below shows the Zener regulator. Calculate

10

- i) current through the series resistance
- ii) minimum and maximum load currents and
- iii) minimum and maximum zener currents.



- b) With neat Diagram explain the transistor series regulator.

06

Q.7 a) Describe the design procedure for the digital multimeter.

08

- b) Draw the basic block diagram of the signal conditioning circuit and explain it in brief.

08

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Set **P**

M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Network Analysis and Synthesis (MSC02102)

Day & Date: Thursday, 20-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

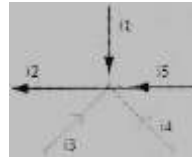
- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
 2) Attempt any Three questions from Q.No.3 to Q.No.7.
 3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) Reactance curve is basically a graph of individual reactance verses _____.
 - a) Frequency
 - b) Time
 - c) Voltage
 - d) current
- 2) Kirchoffs voltage law is based on principle of conservation of _____.
 - a) Energy
 - b) Momentum
 - c) Mass
 - d) Charge
- 3) What is the SI unit for quality factor?
 - a) HZ
 - b) kHz
 - c) MHz
 - d) No unit
- 4) In a series circuit having resistance and inductance, the quality factor is _____.
 - a) $\omega L/R$
 - b) $R/\omega L$
 - c) ωL
 - d) R
- 5) The Norton current is the _____.
 - a) Short circuit current
 - b) Open circuit current
 - c) Open circuit and short circuit current
 - d) Neither open circuit nor short circuit current
- 6) For the Reciprocity Theorem to satisfy the ratio of response to excitation before and after the source is replaced should be?
 - a) different
 - b) Same
 - c) before source is replaced is greater than after the source is replaced
 - d) before source is replaced is less than after the source is replaced
- 7) A junction or a point where two (or more) network elements intersect is called as _____.
 - a) Node
 - b) Branch
 - c) Loop
 - d) Mesh
- 8) To analyze circuits using the nodal analysis _____ law is required.
 - a) KCL
 - b) KVL
 - c) Ohm's
 - d) Both a and c

- 9) Determine the resonant frequency for the specifications: $R = 10\Omega$, $L = 0.1H$, $C = 10\mu F$.
- | | |
|--------|--------|
| a) 157 | b) 158 |
| c) 159 | d) 160 |

10) What is the relation between currents in the figure below?



- | | |
|----------------------------------|----------------------------------|
| a) $i_2 = i_1 + i_3 + i_4 + i_5$ | b) $i_2 - i_1 = i_3 - i_4 + i_5$ |
| c) $i_3 + i_4 = i_1 + i_2 + i_5$ | d) $i_1 + i_5 = i_2 + i_3 + i_4$ |

B) Write true/false

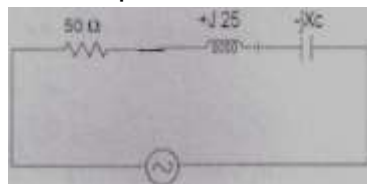
06

- 1) In a parallel resonant circuit, the circuit current at resonance is maximum.
- 2) In a series R, L, C circuit the impedance triangle is the same when $X_L < X_C$ and $X_L > X_C$
- 3) In Thevenin's theorem, V_{Th} (Thevenin Voltage) and Z_{Th} (Impedance) are connected in series mode.
- 4) In network synthesis, excitation and response are given, the network has to be determined.
- 5) In positive real functions, residue test is carried out when poles lie on the $j\omega$ (imaginary) axis.
- 6) Laplace transform of unit impulse function is 1.

Q.2 Answer the following.

16

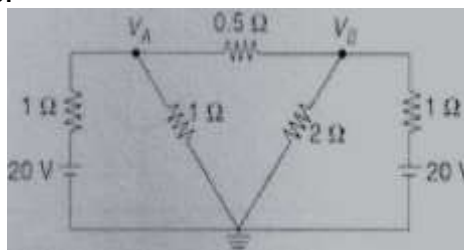
- a) Explain the parallel combinations of resistors.
- b) What is loop? Explain the steps to be followed in mesh analysis.
- c) Determine the values of X_C and impedance at resonance for the circuit below.



- d) Explain the following laws:
- | | |
|--------|---------|
| i) KCL | ii) KVL |
|--------|---------|

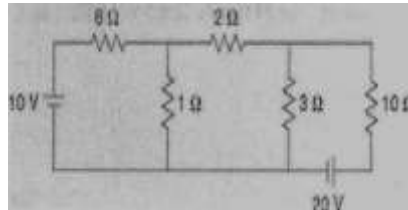
Q.3 Answer the following.

- a) Derive an expression for bandwidth of a series RLC circuit. **10**
- b) Calculate the current through 2Ω resistor for the network shown below **06**
using node analysis.



Q.4 Answer the following.

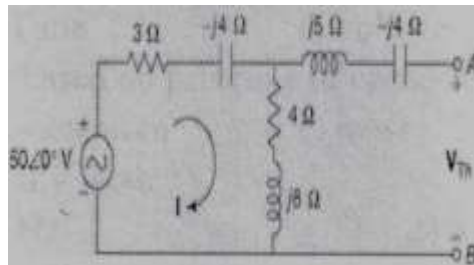
- a) Find the current through the 2Ω resistor of the network shown below using mesh analysis. 08



- b) Derive an expression for resonant frequency of a tank circuit in parallel resonant circuit. 08

Q.5 Answer the following.

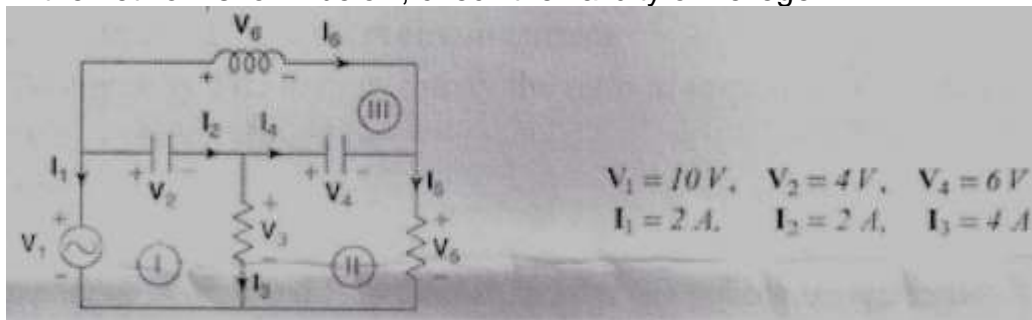
- a) Explain Thevenin's theorem. Obtain Thevenin's equivalent network for the terminals A and B below. 10



- b) Test whether the polynomial $P(s) = s^4 + 7s^3 + 6s^2 + 21s + 8$ is Hurwitz using Routh-array method. 06

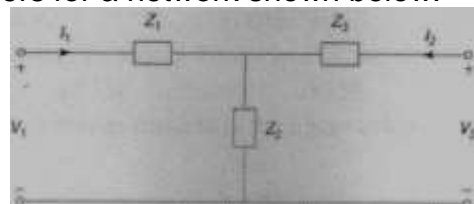
Q.6 Answer the following.

- a) Explain network solutions using first order differential equation. 08
 b) In the network shown below, check the validity of Tellegen's theorem. 08



Q.7 Answer the following.

- a) Find the Z parameters for a network shown below. 08



- b) Explain short circuit admittance. 08

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M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Signals and Systems (MSC02103)

Day & Date: Friday, 21-07-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. No. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to 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) $Y(t) = x(t/5)$ is _____.
 - a) Compressed signal
 - b) Expanded signal
 - c) Time shifted signal
 - d) Amplitude scaled signal by factor 1/5
 - 3) The type of systems which are characterized by input and the output quantized at certain levels are called as _____.
 - a) Analog
 - b) Discrete
 - c) Continuous
 - d) Digital
 - 4) All causal systems must have the component of _____.
 - a) memory
 - b) time invariance
 - c) stability
 - d) linearity
 - 5) In the equation $x(t) = be^{at}$ if $a < 0$, then it is called _____.
 - a) Growing exponential
 - b) Decaying exponential
 - c) Complex exponential
 - d) Both Growing and Decaying exponential
 - 6) Exponentially damped sinusoidal signal is _____.
 - a) Periodic
 - b) Non periodic
 - c) Insufficient information
 - d) May be periodic
 - 7) When $t < 0$, the unit signal amplitude must be _____.
 - a) One
 - b) Zero
 - c) Infinity
 - d) None of the above
 - 8) How many inputs does the system have?
 - a) Only one
 - b) Only two
 - c) One or more inputs
 - d) None of the above
 - 9) _____ are the examples of signal.
 - a) Human voice
 - b) Electrical signals
 - c) Voltage on telephone wires
 - d) All of the above

- 10) In a _____ signal, we can define the value of the signal at any instant of time?
- a) Continuous
 - b) Discrete
 - c) Both a and b
 - d) None of the above

B) Write True / False **06**

- 1) The inputs of the system are called Excitation.
- 2) A Communication system is an example of the system.
- 3) The continuous-time always indicated with n.
- 4) There are four types of Fourier series.
- 5) The operation on signals perform only on amplitude.
- 6) Causal system satisfies the superposition principle.

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

- a) Explain relation between unit step & impulse.
- b) Discuss Fourier Transform for signals.
- c) Discuss Laplace Transform for signals.
- d) State condition for periodicity of a signal.

Q.3 Answer the following. **06**

- a) Explain types of discrete time signals with diagrams. **06**
- b) Explain **10**
 - i) Time Scaling
 - ii) Time Shifting
 - iii) Time Reversal

Q.4 Answer the following. **10**

- a) Draw the following continuous time signals: **10**
 - i) Impulse
 - ii) Unit step
 - iii) Unit ramp
 - iv) Sinusoidal
 - v) Real exponential
- b) Explain even and odd signals with helps of examples. **06**

Q.5 Answer the following. **08**

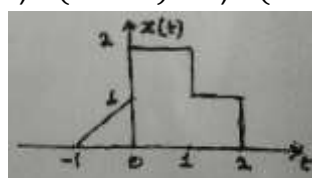
- a) Discuss the classification of Discrete Time systems with examples. **08**
- b) Explain properties of linear time-invariant systems **08**

Q.6 Answer the following. **09**

- a) Define Convolution. Explain properties of discrete convolution. **09**
 - i) Commutative
 - ii) Associative
 - iii) Distributive
- b) Explain poles & Zeros concept in Laplace transform. **07**

Q.7 Answer the following. **10**

- a) State and prove properties of Laplace Transform. **10**
- b) For the signal shown, Find i) $x(2t + 2)$ ii) $x(t - 1)$ iii) $x(1 - 3)$ **06**



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M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Microcontrollers and Interfacing (MSC02108)

Day & Date: Saturday, 22-07-2023
 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 the correct alternative 10

- 1) _____ instruction is applicable to clear any bit while performing bitwise operation settings.
 - a) bcf
 - b) bsf
 - c) Both a & b
 - d) None of the above
- 2) PIC 16F877A have _____ bytes of data EEPROM.
 - a) 128
 - b) 256
 - c) 16
 - d) 512
- 3) Setting a TRISA bit = 1 will make the corresponding PORTA pin an _____.
 - a) Input
 - b) Output
 - c) Both a & b
 - d) None of the above
- 4) The standard form of SPI is _____.
 - a) Serial Program Interface
 - b) Serial Peripheral Internal
 - c) Serial Peripheral Interface
 - d) Serial Parallel Interface
- 5) The Timer 0 module is a _____ bit timer/counter.
 - a) 16
 - b) 4
 - c) 12
 - d) 8
- 6) Flash Program Memory of PIC 16F877A is _____.
 - a) 8K
 - b) 16K
 - c) 4K
 - d) 32K
- 7) PIC 16F877A has 8 channels of _____ bit Analog-to-Digital (A/D) converter.
 - a) 2
 - b) 4
 - c) 10
 - d) 8
- 8) The PIC 16F877A 44-Pin available in _____ package.
 - a) QFN
 - b) TQFP
 - c) PLCC
 - d) All of the above
- 9) PORT-D of PIC16F877A is a _____ bit wide
 - a) 6
 - b) 4
 - c) 8
 - d) 3
- 10) The PIC16F87XA devices have a _____ bit program counter
 - a) 6
 - b) 16
 - c) 8
 - d) 13

- B) Will in the blanks or write True or False** **06**
- 1) Zero flags are more likely to get affected in status registers by ALU of microcontroller.
 - 2) High on MCLR (master clear) pin allows to reset the PIC.
 - 3) The instruction set of PIC microcontroller consists of just 100 instructions.
 - 4) PORT E has three pins.
 - 5) The PSA and PS2:PS0 bits determine the prescaler assignment and prescale ratio.
 - 6) INCF means the contents of register 'f' are incremented by 2.
- Q.2 Answer the following.** **16**
- a) Write the features of PIC Microcontroller.
 - b) Write a short note on a CCP module.
 - c) Write a short note on oscillator and clock of PIC microcontroller.
 - d) What is common anode and common cathode 7-segment display? Explain in short.
- Q.3 a)** Explain how to interface push button with PIC microcontroller with C program. **08**
- b)** What are modes of operation of timers in PIC micro controller? Describe T1CON Register. **08**
- Q.4 a)** Discuss in detail about the Analog to Digital Conversion (ADC) of PIC Microcontroller. **10**
- b)** What are the addressing modes of PIC microcontroller? **06**
- Q.5 a)** Draw an internal architecture diagram of PIC Microcontroller. Explain each block in detail. **10**
- b)** Explain how to interface Relay with PIC microcontroller with C program. **06**
- Q.6 Answer the following**
- a) Draw 40-pin diagram of PIC microcontroller. Explain the function of each pin in detail. **10**
 - b) Explain how to interface LED with PIC microcontroller with C program. **06**
- Q.7 Answer the following**
- a) Describe the Instruction set of PIC16F877A microcontroller. **08**
 - b) Explain the UART in PIC micro controller. **08**

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M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Control Systems (MSC02201)

Day & Date: Wednesday, 19-07-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

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

- Q.1 A) Choose the correct alternative from the options. 10**
- 1) Which system has the tendency to oscillate.
 - a) Closed loop system.
 - b) Open loop system.
 - c) Both A and B.
 - d) Semi-closed loop system
 - 2) If gain of the open loop control system is doubled, the gain margin will be _____.
 - a) is not affected.
 - b) gets doubled.
 - c) becomes one-fourth.
 - d) becomes half.
 - 3) A system with gain margin close to unity or a phase margin close to zero is called as _____ system
 - a) Unstable
 - b) oscillatory
 - c) relatively stable
 - d) highly stable
 - 4) Polar plot of $G(j\omega) = \frac{1}{1 + j\omega\tau}$
 - a) crosses the negative real axis.
 - b) crosses the negative imaginary axis.
 - c) crosses the positive imaginary axis.
 - d) None of the above.
 - 5) When a unit step voltage drives a lag network the output
 - a) remains constant at unit step value
 - b) increases exponentially from zero to final value
 - c) decreases exponentially from 1 to 0
 - d) either (b) or (c) depending on values of R and C
 - 6) From the noise point of view, bandwidth of the control system should _____.
 - a) not be too large
 - b) should be as large as possible
 - c) should be infinite
 - d) be large
 - 7) The input to a controller is
 - a) error signal
 - b) desired variable value
 - c) sensed signal
 - d) servo-signal
 - 8) _____ is not the feature of a good control system
 - a) good accuracy
 - b) good stability
 - c) slow response
 - d) sufficient power handling capacity

- 9) In case of an open loop control system which of following statement is true?
 a) Output is dependent of control input.
 b) Only system parameters have effect on control output.
 c) Output is independent of control input.
 d) None of these.
- 10) _____ is an example of the open loop control system?
 a) Field controlled de motor b) Metadyne
 c) Stroboscope d) Semi-closed system

B) Write true/false.

06

- 1) In a signal flow graph, nodes are represented by small circle
- 2) In second order system, open loop poles remain independent of gain (k)?
- 3) In P-I controller, an integral function computes the area under the curve.
- 4) . The value of steady state error is nonzeroin closed loop control systems
- 5) Type 0 systems are suitable for ramp inputs
- 6) Break awaypoint on root locus specifies the meeting or collision of two zeros

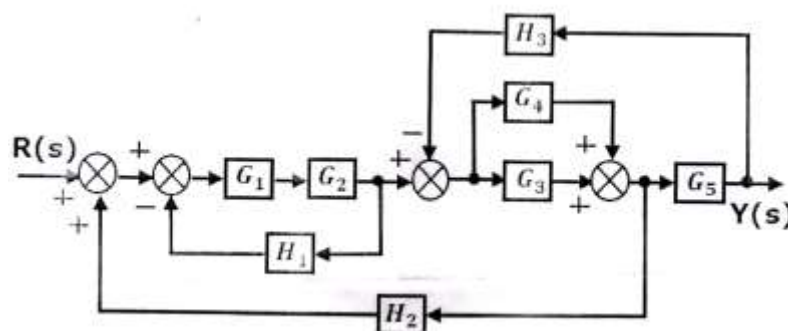
Q.2 Answer the following.

16

- a) Discuss in brief Proportional Controller
- b) Write short note on Signal flow graph
- c) What is control system? What are its components?
- d) With neat block diagram explain close loop control system

Q.3 Answer the following.

- a) What are the block diagram reduction rules? 06
- b) Simplify the following block diagram using the block diagram reduction rules. 10



Q.4 Answer the following.

- a) Explain the stability of given equation using Hurwitz method. 06
 $7S^3 + 5S^2 + 4S + 9 = 0$
- b) Explain the time response of second order system subject to unit step input 10
 for the following cases:
 i) under-damped
 ii) critically damped

Q.5 Answer the following.

- a) Derive an expression for the transfer function of closed loop system. **08**
- b) What is root locus? Consider the system with $G(s).H(s) = K/S(S + 2) (S + 4)$. Find whether $S = -0.85 + j.6$ is on root locus or not using angle condition. **08**

Q.6 Answer the following.

- a) Discuss in brief the following frequency response specifications: **09**
- 1) Response peak
 - 2) Band width
 - 3) Cut-off frequency.
- b) Sketch the Bode Plot for a unity feedback system characterized by the open loop transfer function, **07**
- $$G(s) =$$
- Find
- 1) Gain Margin
 - 2) Phase Margin
 - 3) Stability of the System

Q.7 Answer the following.

- a) Explain the PID control action and list advantages and disadvantages. **10**
- b) Explain the design of gear trains with its transfer function and draw its block diagram. **06**

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M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
ELECTRONIC SCIENCE
Digital Signal Processing (MSC02202)

Day & Date: Sunday, 23-07-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. No. 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) The Z-Transform $X(z)$ of a discrete time signal $x(n)$ is defined as:
 - a) $\sum_{n=-\infty}^{\infty} x(n)Z^n$
 - b) $\sum_{n=-\infty}^{\infty} x(n)Z^{-n}$
 - c) $\sum_{n=0}^{\infty} x(n)Z^n$
 - d) None of the mentioned
- 2) If $x(n)$ is a real sequence and $X(k)$ is its N-point DFT, then which of the following is true?
 - a) $X(N - k) = X(-k)$
 - b) $X(N - k) = X^*(k)$
 - c) $X(-k) = X^*(k)$
 - d) None of the mentioned
- 3) Which of the following is true in case of Overlap add method?
 - a) M zeros are appended at last of each data block
 - b) M zeros are appended at first of each data block
 - c) M-1 zeros are appended at last of each data block
 - d) M-1 zeros are appended at first of each data block
- 4) Identify nonperiodic signal
 - a) $x(t) = \cos 2t$
 - b) $x(t) = \cos 2\pi t u(t)$
 - c) $x(t) = \sin 2t$
 - d) $x(t) = \sin(2\pi/3)t$
- 5) The system given $y(t) = x(t - 2) + x(2 - t)$ is _____.
 - a) Causal
 - b) Static
 - c) Non causal
 - d) All of these
- 6) The system described by the input-output equation $y(n) = nx(n) + b$ is a _____.
 - a) Static system
 - b) Linear system
 - c) Dynamic system
 - d) Static and linear system
- 7) For an analog LTI system to be stable, where should the poles of system function $H(s)$ lie?
 - a) Right half of s-plane
 - b) Left half of s-plane
 - c) On the imaginary axis
 - d) At origin
- 8) What is the condition on the system function of a linear phase filter?
 - a) $H(z) = z^{-N}H(z^{-1})$
 - b) $H(z) = z^N H(z^{-1})$
 - c) $H(z) = \pm z^N H(z^{-1})$
 - d) $H(z) = \pm z^{-N} H(z^{-1})$

- 9) In bilinear transformation, the left-half s-plane is mapped to which of the following in the z- domain?
- Entirely outside the unit circle $|z| = 1$
 - Partially outside the unit circle $|z| = 1$
 - Partially inside the unit circle $|z| = 1$
 - Entirely inside the unit circle $|z| = 1$
- 10) If $s = \sigma + j\Omega$ and $z = re^{j\omega}$ then what is the condition on σ if $r < 1$.
- $\sigma > 0$
 - $\sigma < 0$
 - $\sigma > 1$
 - $\sigma < 1$

B) Write TRUE or FALSE

06

- Backward difference rule is used in the bilinear transformation.
- To reduce side lobes, the frequency specifications have to be optimized in transition region of the filter.
- 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 delayed signal.
- If the system is initially relaxed at time $n = 0$ and memory equals to zero, then the response of such state is called as zero state response.
- If all the poles of $H(z)$ are inside the unit circle, then the system is said to be stable.
- In Bilinear Transformation, aliasing of frequency components is been avoided.

Q.2 Answer the following.

16

- State the properties of ROC of z-transform.
- Prove the linearity property of DFT.
- Draw the direct I form for the function $H(Z) = 1 + 5Z^{-1} + 3Z^{-2} + 2Z^{-3} + Z^{-4}$
- Verify the given system is linear or not? $y(n) = a.x(n) + b$

Q.3 Answer the following.

- Find convolution using overlap add method for $x(n) = \{1,2, -1,2,3, -2, -3, -1,1,1,2, -1\}$ and $h(n) = \{1,2,1\}$
- Draw the cascade structure for the system

08

08

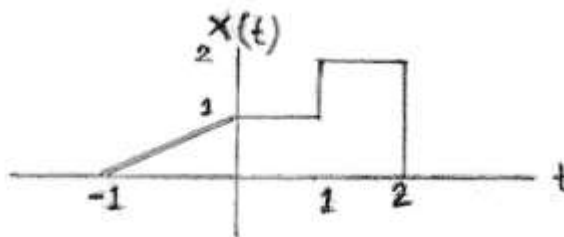
$$H(Z) = \frac{1 + \frac{1}{2}Z^{-1}}{(1 - Z^{-1} + \frac{1}{2}Z^{-2})(1 - Z^{-1} + \frac{1}{4}Z^{-2})}$$

Q.4 Answer the following.

- Find circular convolution of $x(n) = \{1,2,2,1\}$ and $h(n) = \{1,1,1,1\}$
- Draw even and odd part of the signal shown below

08

08



Q.5 Answer the following.

- Find 8 Point DFT of $x(n) = \{1,3,1,2,1,3,1,2\}$ using radix-2 DIT FFT algorithm.
- Find convolution sum 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. **10**

$$H_d(e^{jw}) = e^{-2jw} \quad \text{for } -\pi/4 \leq w \leq \pi/4$$

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

Find the values for $h(n)$ for $N = 9$ using rectangular window.

- b) Using bilinear transformation obtain $H(Z)$ if **06**
 $H(S) = \frac{s+0.1}{(s+0.1)^2+9}$ and $T = 0.1$ s

Q.7 Answer the following.

- a) Find 8-point DFT using DIF-FFT algorithm for the given sequence **08**
 $x(n) = \{1,2,1,2,1,2,1,2\}$
- b) Find inverse z-transform of **08**
 $X(z) = \frac{1}{1-0.8z^{-1}+0.12z^{-2}}$ if ROC is $|z| < 0.2$

Seat
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M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE

Advanced Microcontrollers and Protocols (MSC02206)

Day & Date: Tuesday, 25-07-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
 2) Attempt any Three questions from Q. No. 3 to Q. No. 7
 3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.

10

- 1) ARM has Operating modes _____.
 - a) 5
 - b) 6
 - c) 7
 - d) 4
- 2) BIC is Instruction _____.
 - a) arithmetic
 - b) logical
 - c) data
 - d) none of the above
- 3) RISC stands for _____.
 - a) Reduced instruction set computer
 - b) Reduced instruction super computer
 - c) Rolled Instruction set code
 - d) None of the above
- 4) ARM is used in Mobile because _____.
 - a) ARM required less power
 - b) ARM required more power
 - c) ARM required Medium power
 - d) none of the above
- 5) In ARM SPI bus stands for _____.
 - a) Serial power Interrupt
 - b) Serial Peripheral Interface
 - c) Serial Power In
 - d) None of the above
- 6) PLL in ARM stands for _____.
 - a) Phase locked loop
 - b) Phase level loop
 - c) Phase linear loop
 - d) None of the above
- 7) ARM is based on _____.
 - a) RISC
 - b) CISC
 - c) RISC and CISC
 - d) None of the above
- 8) BHI is instruction for _____.
 - a) Logical operation
 - b) Arithmetic Operation
 - c) data Processing
 - d) Branch
- 9) CPSR stands for _____.
 - a) Current power switch register
 - b) Current Program status register
 - c) Current program switch register
 - d) None of the above

- 10) How many registers are there in ARM7?
 a) 35 register (28 GPR and 7 SPR)
 b) 37 registers (28 GPR and 9 SPR)
 c) 37 registers (31 GPR and 6 SPR)
 d) 35 register (30 GPR and 5 SPR)

B) Write True /False 06

- 1) ARM Processor specifically designed for to reduce size & power consumption
- 2) Load instructions used to transfer the data from register to memory.
- 3) Keil-5 is IDE used for Embedded device programming.
- 4) ARM is 16bit Microcontroller.
- 5) Thumb has lower code density.
- 6) ARM7 has an in-built debugging device

Q.2 Answer the following. 16

- a) Differentiate CISC and RISC architectures.
- b) Which are the different features of ARM instruction set that make it suitable for embedded applications.
- c) Explain the AMBA bus protocol.
- d) Explain difference between Processor and Microcontroller

Q.3 Answer the following. 10

- a) With a neat diagram explain the different hardware components of an embedded device based on ARM core. 10
- b) Give different applications of ARM processors. 06

Q.4 Answer the following 08

- a) With a neat diagram explain the different general purpose registers of ARM processors. 08
- b) Differentiate ARM and Thumb instruction set features. 08

Q.5 Answer the following 10

- a) Explain five thumb instructions in ARM. 10
- b) Briefly Explain IDE Keil-5. 06

Q.6 Answer the following 10

- a) Explain five instructions with syntax of ARM instruction set. 10
- b) What is SPI? Explain SPI operations. 06

Q.7 Answer the following 08

- a) Write a program for switch interfacing using Embedded C for ARM processor. 08
- b) How messaging can be done using CAN protocol. 08

Seat No.	
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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Process Control (MSC02301)

Day & Date: Monday, 10-07-2023
 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) The bandwidth for a good control system is _____.
 - a) very small
 - b) large
 - c) medium
 - d) none of the above
- 2) The standard for long distance analog signal transmission in process control industry is _____.
 - a) 4-20 mV
 - b) 1-5 mV
 - c) 1-5 V
 - d) 5-10 V
- 3) _____ element is not used in an automatic control system.
 - a) Oscillator
 - b) Process
 - c) Measurement
 - d) Evaluation
- 4) What is average potential of neural liquid in inactive state.
 - a) +70mv
 - b) +35mv
 - c) -35mv
 - d) -70mv
- 5) The transfer function for a P-D controller is _____.
 - a) $K_p + K_{DS}$
 - b) K_I/s
 - c) K_P
 - d) K_{DS}
- 6) Cascade control means _____.
 - a) feed forward control
 - b) more than one feed-back loop
 - c) Both a & b
 - d) None of theses
- 7) _____ is element of process dynamics.
 - a) Resistance
 - b) Process
 - c) Evaluation
 - d) Inductance
- 8) Process gain is defined as the ratio of change in _____ to the change in _____.
 - a) input, output
 - b) output, input
 - c) final, initial
 - d) none of the above
- 9) DMC full form is _____.
 - a) Digital Mode Converter
 - b) Digital Matrix Control
 - c) Dynamic Matrix Converter
 - d) Dynamic Matrix Control
- 10) ON-OFF control which is a special case of proportional control has a band width of about _____ percent.
 - a) 25
 - b) 50
 - c) 100
 - d) 0

- B) Write True or false** **06**
- 1) The term hysteresis is associated with ON-OFF control
 - 2) Discontinuous controller mode has only two position controller and multiposition controller.
 - 3) Temperature control system is known as Servomechanism.
 - 4) The key advantage of PI controller is that it eliminates the offset.
 - 5) SLPC interface with smart field devices.
 - 6) In a stable control system backlash can cause due to low-level oscillations.
- Q.2 Answer the following.** **16**
- a) Compare between open loop and closed loop system.
 - b) Explain non self regulating Process.
 - c) Why do we need to do process control?
 - d) What is D controller? Write equation for its output.
- Q.3 Answer the following.**
- a) With the help of neat sketch illustrate the temperature control loop diagram. **10**
 - b) Explain in detail about relay based auto-tuning. **06**
- Q.4 Answer the following.**
- a) What are the discontinuous controller modes? Explain one of them in detail. **08**
 - b) With a neat diagram explain the elements of process dynamics. **08**
- Q.5 Answer the following.**
- a) Explain Proportional Integral (PI) controller and write the transfer function with second order system. **10**
 - b) Write a short note on process dead-time and process time constant. **06**
- Q.6 Answer the following.**
- a) Explain single loop process control in short. Compare SLPC with MLPC. **10**
 - b) Explain in short analog input scaling and analog output scaling. **06**
- Q.7 Answer the following.**
- a) What are the types of self tuning controller? Explain in short. **08**
 - b) Explain Model Predictive Controller (MPC) in detail. **08**

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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
ELECTRONIC SCIENCE

Microwave Devices and Applications (MSC02302)

Day & Date: Tuesday, 11-07-2023
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 alternatives.

10

- 1) How many layers does Gunn diode has?
 - a) One
 - b) Two
 - c) Three
 - d) Four
- 2) Instead of using a p-n junction for a gate, MESFET used _____.
 - a) Metal semiconductor junction
 - b) Non metal semiconductor junction
 - c) Metal conductor Junction
 - d) Metal Superconductor junction
- 3) In order to achieve high current density, a compromise in _____ is made in a TRAPATT diode.
 - a) Gain
 - b) Size
 - c) Operating frequency
 - d) None
- 4) Which is not Microwave device?
 - a) Integrated Circuit
 - b) Light Emitting diode
 - c) Transistor
 - d) Veracity diode
- 5) The two-valley model of the Ridley Watkins theory is best suited to explain the working of which one of the following.
 - a) Gunn diode oscillator
 - b) Quartz Crystal
 - c) Klystron Oscillator
 - d) R-C oscillator
- 6) In MESFET for a gate _____ junction is used
 - a) pnp
 - b) Schottky
 - c) npn
 - d) N
- 7) What are the advantages of Gunn diode?
 - a) High efficiency
 - b) Highly immune to noise
 - c) Large size
 - d) High cost
- 8) The Gunn diodes are made with _____ components?
 - a) GaAs
 - b) InP
 - c) CdTe
 - d) All the above
- 9) In construction and terminology MESFET is similar to _____.
 - a) JFET
 - b) BJT
 - c) PMOS
 - d) NMOS
- 10) Coupling into and out of a traveling-wave tube can be accompanied by a _____.
 - a) Waveguide match
 - b) Direct coax-helix match
 - c) Cavity match
 - d) All of the above

- B) Fill in the blanks or write True or false. 06**
- 1) P layers is heavily doped in Gunn diode.
 - 2) Both IMPATT and TRAPATT devices use avalanche effect.
 - 3) In Reflex Klystron oscillator the focussing electrode is at a high potential.
 - 4) The bunching action which occurs in multicavity klystron amplifier can be represented by Applegate diagram.
 - 5) TRAPATT diode is normally mounted at a point inside a coaxial resonator where there is minimum RF voltage swing.
 - 6) In a TWT the amplitude of resultant wave travelling down the helix remains constant.
- Q.2 Answer the following. 16**
- a) Discuss different biasing techniques used for microwave BJT in short.
 - b) Describe any one mode of operation of Reflex klystron.
 - c) Compare IMPATT and TRAPATT.
 - d) What are the limitations of conventional solid state devices at microwaves?
- Q.3 Answer the following. 08**
- a) What is the operating principle of tunnel diode? Explain the working of its in detail. 08
 - b) Explain GaAs MESFET with structure and principle of operation? Why GaAs MESFETs are preferred over Si MESFETs? 08
- Q.4 Answer the following. 10**
- a) What is TRAPATT diode? Explain elaborately their principle of operation with neat diagram. 10
 - b) Describe Ridley- Watkins- Hilsum theory in detail. 06
- Q.5 Answer the following. 08**
- a) Explain in detail Limited space charge accumulation (LSA) mode of Gunn diode. 08
 - b) What is Gunn Effect? Explain INP Gunn diode in detail. 08
- Q.6 Answer the following. 08**
- a) What are the applications of Microwave BJT? Explain its different working region. 08
 - b) What is Gunn Effect? Explain INP Gunn diode in detail. 08
- Q.7 Answer the following. 08**
- a) What are the cross field devices? Explain the working of Cylindrical Magnetron oscillator. 08
 - b) What does IMPATT diode stands for and with neat diagram explain the construction and working of it and derive power and efficiency of the same? 08

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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Embedded System Design (MSC02306)

Day & Date: Wednesday, 12-07-2023
 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 alternative. 10

- 1) _____ is the processor used by ARM7?
 - a) 8-bit CISC
 - b) 8-bit RISC
 - c) 32-bit CISC
 - d) 32-bit RISC
- 2) _____ many registers are there in ARM7?
 - a) 35 registers (28 GPR and 7 SPR)
 - b) 37 registers (28 GPR and 9 SPR)
 - c) 37 registers (31 GPR and 6 SPR)
 - d) 35 registers (30 GPR and 5 SPR)
- 3) _____ is the capability of ARM7 instruction for a second?
 - a) 110 MIPS
 - b) 150 MIPS
 - c) 125 MIPS
 - d) 130 MIPS
- 4) ARM7DI operates in _____ mode?
 - a) Big Endian
 - b) Little Endian
 - c) Both big and little Endian
 - d) Neither big nor little Endian
- 5) CISC stands for _____.
 - a) Complete Instruction Sequential Compilation
 - b) Computer Integrated Sequential Compiler
 - c) Complex Instruction Set Computer
 - d) Complex Instruction Sequential Compilation
- 6) What are t, d, m, I stands for in ARM7TDMI?
 - a) Timer, Debug, Multiplex, ICE
 - b) Thumb, Debug, Multiplier, ICE
 - c) Timer, Debug, Modulation, IS
 - d) None of these
- 7) How many instructions pipelining is used in ARM7?
 - a) 3-Stage
 - b) 4-Stage
 - c) 5-Stage
 - d) 2-stage
- 8) How many bit data bus is used in ARM7EJ-s?
 - a) 32-bit
 - b) 16-bit
 - c) 8-bit
 - d) Both 16 and 32 bit

- 9) In real time operating system_____.
- a) all processes have the same priority
 - b) a task must be serviced by its deadline period
 - c) process scheduling can be done only once
 - d) kernel is not required
- 10) For real time operating systems, interrupt latency should be _____.
- a) Minimal
 - b) maximum
 - c) zero
 - d) dependent on the scheduling

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

- 1) In FCFS scheduling certain amount of CPU time is allocated to each process?
- 2) Time required to synchronous switch from the context of one thread to the context of another thread is called context switch time.
- 3) I2C uses two wires SDA & SCL.
- 4) ARM has 6 processor modes.
- 5) The address space in ARM is 2^{16} .
- 6) Round robin is one type of scheduling in RTOS.

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

- a) Explain CISC design philosophy?
- b) Explain Harvard Architecture with suitable diagram.
- c) Explain CP SR register in ARM processor.
- d) Explain communication protocol SPI.

Q.3 Answer the following.

- a) Explain AMBA protocol with block diagram.
- b) Explain functions of any OS.

08**08****Q.4 Answer the following.**

- a) Explain pipeline feature in ARM 9.
- b) Explain real time operating systems.

08**08****Q.5 Answer the following.**

- a) Explain five instructions from Arithmetic instruction group in ARM.
- b) What is IPC in RTOS? Explain in short.

08**08****Q.6 Answer the following.**

- a) Explain five MOVE instruction group ARM instruction set.
- b) Explain difference in services between RTOS and traditional OS.

08**08****Q.7 Answer the following.**

- a) Explain term Watch dog timer (WDT) and Real time clock (RTC).
- b) Explain deadlock & semaphore concept in RTOS.

08**08**

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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Optical Fiber Communication (MSC22401)

Day & Date: Monday, 10-07-2023
 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) What is done to create an extrinsic semiconductor?
 - a) Refractive index is decreased
 - b) Doping the material with impurities
 - c) Increase the band-gap of the material
 - d) Stimulate demission
- 2) The phenomenon leading to avalanche breakdown in reverse-biased diodes is known as _____.
 - a) Auger recombination
 - b) Mode hopping
 - c) Impact ionization
 - d) Extract ionization
- 3) More sophisticated structure than p-i-nphotodiode ____
 - a) Avalanche photodiode
 - b) p-n junction diode
 - c) Zener diode
 - d) Varactor diode
- 4) A multimode step index fiber has a large core diameter of range ____
 - a) 100 to 300 μm ,
 - b) 200 to 500 μm
 - c) 100 to 300 nm
 - d) 200 to 500 nm
- 5) The bandwidth of Multimode step index Fiberis ____
 - a) 2 to 30 MHz km
 - b) 6 to 50 MHz km
 - c) 10 to 40 MHz km
 - d) 8 to 40 MHz km
- 6) Which equations are best suited for the study of electromagnetic wave propagation?
 - a) Maxwell's equations
 - b) Avrami equations
 - c) Allen-Cahn equations
 - d) Boltzmann's equations
- 7) Graded index optical fiber behave the step index when ____
 - a) $\alpha=1$
 - b) $\alpha=2$
 - c) $\alpha=10$
 - d) $\alpha=\infty$
- 8) In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of ____
 - a) Light Collection
 - b) Light Dispersion
 - c) Light Scattering
 - d) Light Polarization
- 9) The core of an optical fiber has a _____.
 - a) Lower refracted index than air
 - b) Lower refractive index than the cladding
 - c) Higher refractive index than the cladding
 - d) Similar refractive index with the cladding

- 10) The fraction of incident photons generated by photodiode of electrons generated collected at detector is known as _____
- a) Quantum efficiency
 - b) Responsivity
 - c) Absorption coefficient
 - d) Anger recombination

B) Fill in the blanks OR Write True or false **06**

- 1) Multimode step index fiber has large core diameter and large numerical aperture.
- 2) Refractive index of cladding is greater than core.
- 3) Multimode graded index fibers use incoherent source only.
- 4) Decomposition is the first stage in liquid-phase-technique?
- 5) In single mode fibers, graded index is most beneficial index profile.
- 6) Multimode step index fiber has a large core diameter of range is 100 to 300 μm .

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

- a) Describe the attenuation of signal in OFC.
- b) Write four differences between PN and PIN diodes.
- c) Explain attenuation and fiber bend loss.
- d) State Snell's law. Define numerical aperture of OFC.

Q.3 Answer the following.

- a) Explain general optical fiber communication system in brief. Write its advantages and disadvantages. **08**
- b) Write a brief note on types of optical fiber. **08**

Q.4 Answer the following.

- a) Describe liquid-phase techniques for the preparation of multicomponent glasses for optical fibers. Discuss with the aid of suitable diagram one melting method for the preparation of multicomponent glass. **10**
- b) Explain in brief fiber splices. **06**

Q.5 Answer the following.

- a) Explain semiconductor Laser and its characteristic. **08**
- b) Write a short note on LED. **08**

Q.6 Answer the following.

- a) What is scattering. Explain linear and non-linear scattering. **10**
- b) Derive expression for acceptance angle and numerical aperture with suitable sketch. **06**

Q.7 Answer the following.

- a) Explain vapor phase deposition techniques in the preparation of glasses for optical fibers in details. **08**
- b) Explain dispersion measurement in optical fiber. **08**

Seat No.	
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M.Sc. (Semester - IV (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Power Electronics (MSC22402)

Day & Date: Wednesday, 12-07-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 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) Multiple choice questions.

10

- 1) The thyristor turn-off requires that the anode current _____.
 - a) falls below the holding current
 - b) falls below the latching current
 - c) rises above the holding current
 - d) rises above the latching current
- 2) The type of commutation in which the pulse to turn off the SCR is obtained by separate voltage source is _____.
 - a) class B commutation
 - b) class C commutation
 - c) class D commutation
 - d) class E commutation
- 3) di/dt protection is provided to the thyristors by _____.
 - a) Connecting an inductor in parallel across the load
 - Connecting an inductor in series with the load
 - Connecting an inductor in parallel across the gate terminal
 - Connecting an inductor in series with the gate
- 4) The value of anode current required to maintain the conduction of an SCR even though the gate signal is removed is called as the _____.
 - a) holding current
 - b) latching current
 - c) switching current
 - d) peak anode current
- 5) In a three-phase half wave diode rectifier using 3 diodes, each diode conducts for _____.
 - a) 90 degrees
 - b) 120 degrees
 - c) 180 degrees
 - d) 360 degrees
- 6) Natural commutation of an SCR takes place when _____.
 - a) voltage across the device becomes negative
 - b) voltage across the device becomes positive
 - c) gate current becomes zero
 - d) anode current becomes zero
- 7) Class E commutation is a/an _____.
 - a) line commutation technique
 - b) load commutation technique
 - c) forced commutation technique
 - d) external-pulse commutation technique

- 8) For a step-up chopper, when the duty cycle is increased the average value of the output voltage _____.
 - a) increases
 - b) decreases
 - c) remains the same
 - d) none of the mentioned
- 9) For a step-down chopper, if a (duty cycle) = 0.5 then
 - a) $V_o = V_s$
 - b) $V_o < V_s$
 - c) $V_o > V_s$
 - d) none of the mentioned
- 10) AC voltage controllers convert _____.
 - a) fixed ac to fixed dc
 - b) variable ac to variable dc
 - c) fixed ac to variable ac
 - d) variable ac to fixed ac

B) Will in the blanks or write True or False.

06

- 1) Firing angle of the SCR is used to control the on off timing of SCR.
- 2) A full-wave rectifier is less efficient than a half-wave rectifier
- 3) In a single-phase dual converter, if the bridge 1 acts as a rectifier, then the bridge 2 will operate as an inverter.
- 4) A single-phase full-wave full-controlled bridge can also be formed by means of four SCRs.
- 5) The SCR can be considered as a power switching device
- 6) A single-phase full-wave half-controlled bridge requires a separate freewheeling diode.

Q.2 Answer the following

16

- a) Draw the static VI characteristics of a SCR and explain.
- b) What are the necessary conditions for turning ON a SCR?
- c) Describe the principle of phase control in single phase half wave ac voltage regulator.
- d) What is power factor improvement? Explain its types in short with diagram.

Q.3 Answer the following.

- a) Explain the operating principle of step down chopper with R load with suitable diagram. Draw the voltage and current waveforms of chopper & Derive its expression.
- b) Discuss the principle of operation of Buck-boost converter.

08

08

Q.4 Answer the following.

- a) With the help of a neat circuit diagram and waveforms, explain the operation of 3- phase fully controlled bridge rectifier with R load.
- b) Draw the single phase bidirectional ac voltage controller with R load and explain its working principle with waveforms.

08

08

Q.5 Answer the following.

- a) Explain the design of snubber circuit used for a SCR, how it provides different voltage protections?
- b) Derive the average voltage expression of three phase half wave controlled rectifier with R load operated on discontinuous conduction mode.

08

08

Q.6 Answer the following.

- a) Explain the operating principle of single phase dual converter with suitable circuit diagram and waveforms
- b) Draw and explain the block schematic of SMPS and mention its advantages over linear power supply

08

08

Q.7 Answer the following.

- a)** Explain the class B commutation method of SCR with circuit diagram and waveforms. **08**
- b)** What is a step up chopper? Derive an expression for output voltage. **08**

Seat No.	
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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
PLC and SCADA (MSC22403)

Day & Date: Friday, 14-07-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 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) Multiple choice questions.

10

- 1) _____ is one type of human machine interface.
 - a) Monochrome or coloured
 - b) Screens with keypad or touch screens
 - c) Both a and b
 - d) None of the above
- 2) RS485 can be used in _____.
 - a) Two ways
 - b) Three ways
 - c) Four ways
 - d) Five ways
- 3) The protocols in supervisory control and data acquisition system are _____.
 - a) Modbus RTU
 - b) Profibus
 - c) ConitelRP570
 - d) All of the above
- 4) In ladder logic, what is the meaning of the given symbol is _____.
 - a) Normally open contact
 - b) Normally closed contact
 - c) Push button switch
 - d) Selector switch
- 5) PLC operates on the _____ signals.
 - a) Analog
 - b) Digital
 - c) Impulse
 - d) Frequency
- 6) _____ are the components of modern SCADA system.
 - a) Human Machine Interface
 - b) SCADA servers
 - b) SCADA clients
 - d) All of the above
- 7) The heart of the SCADA system is _____.
 - a) CPU
 - b) PLC
 - c) Relays
 - d) I/O task
- 8) The standard form of HMI is _____.
 - a) Human Master Interface
 - b) Human Machine Interface
 - b) Human Main Interface
 - d) None of the above
- 9) _____ are the types of SCADA systems.
 - a) Monolithic, Distributed
 - b) Monolithic, Networked
 - c) Monolithic, Distributed, Networked
 - d) None of the above

- 10) What are the benefits of SCADA system?
- a) Saves money, time, energy
 - b) Increases profitability and productivity
 - c) Expansion capability, cost effective
 - d) All of the above

B) Fill in the blanks or write True or false.**06**

- 1) Ethernet communication protocols used for the interfacing between human machine interface and programmable logic controller.
- 2) The remote telemetry unit contains Power supply, solar array, transceivers, Antenna.
- 3) The standard form of PCN is Process Communication Network.
- 4) The distributed network protocol supports TCP/IP architecture.
- 5) The second-generation SCADA systems were developed or designed in 1970.
- 6) The SCADA is Data analysis oriented

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

- a) Write a short note on Twisted Pair cable.
- b) Comparison between Guided and Unguided media
- c) Write a short note on DB9 connector standard
- d) Differentiate between Open loop and closed loop system

Q.3 Answer the following.

- a) With List the Layers of OSI Model? Describe the Functions of Layer in detail. **10**
- b) Write a short note on USB Connector standard. **06**

Q.4 Answer the following.

- a) What is Transmission media? Explain the Optical fiber media in detail. **10**
- b) Draw the block diagram of PLC and explain the function of CPU. **06**

Q.5 Answer the following.

- a) With a neat diagram explain the TCP/IP reference model give a brief description of each layer. **10**
- b) Write a short note on RS-485 standard. **06**

Q.6 Answer the following.

- a) Draw SCADA architecture. Explain each part in detail. **10**
- b) Explain how SCADA is implemented in water purification system. **06**

Q.7 Answer the following.

- a) List different reports generated in DCS. Explain any one in detail. **10**
- b) Describe bus access method of MODBUS. **06**

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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
ELECTRONICS SCIENCE
Internet of Things (IoT) (MSC22406)

Day & Date: Sunday, 16-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

Q.1 A) Choose the correct alternatives from the options. 10

- 1) What is IoT?
 - a) network of physical objects embedded with sensors
 - b) network of virtual objects
 - c) network of objects in the ring structure
 - d) network of sensors
- 2) Which of the following is false about IoT devices?
 - a) IoT devices use the internet for collecting and sharing data
 - b) IoT devices need microcontrollers
 - c) IoT devices use wireless technology
 - d) IoT devices are completely safe
- 3) Which of the following is not an IoT platform?
 - a) Amazon Web Services
 - b) Microsoft Azure
 - c) Salesforce
 - d) Flipkart
- 4) Which of the following is not a fundamental component of an IoT system?
 - a) Sensors
 - b) Connectivity and data processing
 - c) User interface
 - d) Transformer
- 5) Which of the following is used to capture data from the physical world in IoT devices?
 - a) Sensors
 - b) Actuators
 - c) Microprocessors
 - d) Microcontrollers
- 6) Which of the following command is used to trigger the Amazon echo IOT device?
 - a) Hello
 - b) Suri
 - c) Alexa
 - d) Hey
- 7) Which of the following is not a sensor in IoT?
 - a) BMP280
 - b) DHT11
 - c) Photoresistor
 - d) LED

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- 8) Which of the following is not an actuator in IoT?
 - a) Stepper motor
 - b) A fan
 - c) An LED
 - d) Arduino
- 9) Which of the following is used to reprogram a Bootloader in IoT devices?
 - a) VHDL programming
 - b) IDE
 - c) ICSP
 - d) MANET
- 10) Which of the following is not related to Arduino IDE IoT software?
 - a) Serial monitor
 - b) Verify
 - c) Upload
 - d) Terminate

B) Write true/false

06

- 1) RFID is a part of IoT.
- 2) IoT is use through internet connection, software application and electronic devices to get the learning and teaching materials.
- 3) An IoT ecosystem is a network of organizations that drives the creation and delivery of IoT products and services.
- 4) BLE is a low-power version of the popular Bluetooth 2.4 GHz wireless communication protocol.
- 5) CoAP can be thought of as an alternative to MQTT.
- 6) HTTP is a lightweight protocol, which makes it suitable for IoT applications.

Q.2 Answer the following.

16

- a) Define IoT. Write some common applications of IoT.
- b) What are the features of UAV network?
- c) Explain what is wireless sensor network.
- d) What are advantages of cloud computing?

Q.3 Answer the following.

- a) What is sensor? Explain different types of sensors used in IoT. 08
- b) Write some of the popular IoT communication Protocols. Explain any one. 08

Q.4 Answer the following.

- a) What are different components of IoT? Explain with block diagram. 10
- b) What is Arduino? What are its features? 06

Q.5 Answer the following.

- a) What is cloud computing? Explain block diagram of cloud computing. 08
- b) What are different layers IoT protocol stack? 08

Q.6 Answer the following.

- a) Explain security in cloud computing. **08**
- b) What are the differences between IoT and M2M? **08**

Q.7 Answer the following.

- a) Explain challenges of IoT. **08**
- b) Explain characteristics of IoT **08**