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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Electronic System Design (2320101)

Day & Date: Friday, 05-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All question are compulsory.
 2) Figures to the right indicate full marks.

Q.1 A) Select the correct answer.

08

- 1) _____ of the following is a digital transducer.
 - a) Strain gauge
 - b) Encoder
 - c) Thermistor
 - d) LVDT
- 2) _____ transducer is the temperature transducer.
 - a) Thermocouples
 - b) RTD
 - c) Thermistor
 - d) All of the above
- 3) Active transducer used principle of _____.
 - a) energy conversion
 - b) energy translation
 - c) mass conversion
 - d) volume conversion
- 4) _____ circuit is used in thermistor signal conditioning.
 - a) Wheatstone bridge
 - b) Kelvin bridge
 - c) Maxwell bridge
 - d) Wein bridge
- 5) Signal conditioning circuits used for different sensors consisting of _____.
 - a) Voltage attenuating
 - b) Current attenuating
 - c) Boosting voltage
 - d) Keeping current zero
- 6) The gain of the buffer amplifier is _____.
 - a) less than one
 - b) greater than one
 - c) Infinite
 - d) Unity
- 7) LDR is abbreviated as _____.
 - a) Light detected resistor
 - b) Luminous dependent resistor
 - c) Light determinant resistor
 - d) Light Dependent resistor
- 8) Basic building blocks of Digital multimeter are _____.
 - a) Amplifier and oscillator
 - b) Op-amp and diode circuits.
 - c) Rectifier and Schmitt trigger circuits.
 - d) A/D converter, attenuator, counter.

B) State true or false.

04

- 1) Opt-coupler consists of a phototransistor and a LED.
- 2) A radiation thermometer is suitable for temperatures below 1400 degree centigrade.
- 3) The resistance of strain gauge increases with increase in temperature.
- 4) Alloy of Nickel copper are commonly not used in fabrication of strain gauges.

- Q.2 Answer the following (Any Six) 12**
- a) Draw the circuit diagram of $\pm 5V$ power supply using IC 7805.
 - b) What is sensor? What are types of sensors?
 - c) Draw a circuit diagram of clock circuit using NOT.
 - d) Draw synchronous flip-flop.
 - e) Draw the block diagram of thermocouple signal conditioning circuit.
 - f) Write steps designing SMPS in short.
 - g) What is need of signal conditioning circuit?
 - h) Write any four characteristics of transducer with short explanation.
- Q.3 Answer the following (Any Three) 12**
- a) With neat diagram explain Zener shunt regulator.
 - b) Compare sensor and transducer.
 - c) Write a note on intelligent sensors.
 - d) Describe the bridge instrumentation amplifier.
- Q.4 Answer the following (Any Two) 12**
- a) With neat labelled diagram explain the working of LVDT.
 - b) Explain the construction and working of thermocouple.
 - c) With neat diagram explain the transistor series regulator.
- Q.5 Answer the following (Any Two) 12**
- a) Describe the design procedure for the digital multimeter.
 - b) Write short notes on the following.
 - 1) PH sensor
 - 2) LDR
 - c) Write a note on piezoelectric transducer.

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Microcontroller & Interfacing (2320102)

Day & Date: Sunday, 07-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Q.1 A) Choose Correct alternative**08**

- 1) The ATmega328p belongs to the _____ architecture.
 - a) AVR16
 - b) AVR8
 - c) AVR1
 - d) AVR32
- 2) _____ are used for the Register Bank Selection of PIC16F877A.
 - a) RP1:RP0
 - b) RP2:RP1
 - c) PS1:PS0
 - d) PS2:PS1
- 3) The bit position Global Interrupt Enable in status register of Atmega328 is _____ .
 - a) 6
 - b) 4
 - c) 1
 - d) 7
- 4) _____ used as synchronous serial clock input/output for SPI mode.
 - a) SCL
 - b) SCK
 - c) SFR
 - d) GPR
- 5) Operating Frequency of PIC16F877A is DC _____ MHz.
 - a) 10
 - b) 20
 - c) 30
 - d) 40
- 6) Total _____ ports are available in PIC16F877A.
 - a) 5
 - b) 6
 - c) 4
 - d) 7
- 7) The instruction set of PIC microcontroller consists of just _____ instructions.
 - a) 100
 - b) 25
 - c) 80
 - d) 35
- 8) In ATmega328p: 32 indicartes 32KB of _____ memory.
 - a) flash
 - b) data
 - c) ROM
 - d) RAM

B) Fill in the blanks or write True or false**04**

- 1) PORT-A of PIC 16F877A has 8 pins.
- 2) TIRS is a data direction register for input and output
- 3) The ATmega328 has a 10-bit successive approximation ADC
- 4) BSF instruction can be used to set any bit in PIC

- Q.2 Answer the following (Any Six) 12**
- a) Write a short note on Program counter
 - b) How many communication protocols supported by PIC16f877A? Define each.
 - c) Define CLRW and DECF instruction working.
 - d) Define the flash memory of Atmega328p.
 - e) Describe about the LDR.
 - f) Differentiate between MOSI and MISO.
 - g) How many timer modes are supported in Atmega328p?
 - h) Draw a diagram of LED interface with PIC.
- Q.3 Answer the following (Any Three) 12**
- a) Write the c code only for DC-motor interface with PIC16F877A.
 - b) Explain the below instructions of PIC16F877A with example.
 - i) INCF
 - ii) RRF
 - c) Write the all features of PIC16F877A microcontroller.
 - d) Explain the Capture/Compare/PWM modules of PIC microcontroller
- Q.4 Answer the following (Any Two) 12**
- a) Write an embedded c code for Relay interface with PIC16F877A.
 - b) With a neat schematic explain the block diagram of PIC microcontroller.
 - c) Describe in short about ADC module of PIC microcontroller
- Q.5 Answer the following (Any Two) 12**
- a) Write an embedded c code to display 'Hello' word on 16x2 LCD using PIC16F877A.
 - b) Explain the all ports of PIC microcontroller.
 - c) Explain the T1CON and T2CON register functioning for use of timer/counter in PIC16F877A

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE

Digital Electronics & Verilog HDL (2320108)

Day & Date: Tuesday, 09-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.

Q.1 A) Multiple Choice Questions**08**

- 1) _____ is a type of digital logic circuit.
 - a) Combinational logic circuits
 - b) Sequential logic circuits
 - c) Both Combinational & Sequential logic circuits
 - d) None of the mentioned
- 2) The gates required to build a half adder are _____.
 - a) EX-OR gate and NOR gate
 - b) EX-OR gate and OR gate
 - c) EX-OR gate and AND gate
 - d) EX-NOR gate and AND gate
- 3) Multiplexer means _____.
 - a) It is a type of decoder which decodes several inputs and gives one output
 - b) A multiplexer is a device which converts many signals into one
 - c) It takes one input and results into many output
 - d) It is a type of encoder which decodes several inputs and gives one output.
- 4) _____ is a superset of Verilog.
 - a) Verilog
 - b) VHDL
 - c) System Verilog
 - d) System VHDL
- 5) If two inputs are active on a priority encoder _____ will be coded on the output.
 - a) The higher value
 - b) Neither of the inputs
 - c) The lower value
 - d) Both of the inputs
- 6) A decoder converts n inputs to _____ outputs.
 - a) n
 - b) n²
 - c) 2n
 - d) nn
- 7) PAL refers to _____.
 - a) Programmable Array Loaded
 - b) Programmable Logic Array
 - c) Programmable Array Logic
 - d) Programmable AND Logic
- 8) The difference between a PAL & a PLA is _____.
 - a) PALs and PLAs are the same thing
 - b) The PLA has a programmable OR plane and a programmable AND plane, while the PAL only has a programmable AND plane
 - c) The PAL has a programmable OR plane and a programmable AND plane, while the PLA only has a programmable AND plane
 - d) The PAL has more possible product terms than the PLA

- B) State true or false** **04**
- 1) Verilog is case sensitive.
 - 2) A combinational circuit uses memory and its output depends on both present inputs and present state (previous output).
 - 3) A FPGA is an array of programmable logic blocks that are interconnected by OR gates.
 - 4) Encoders can change the $2N$ input lines into N output lines.
- Q.2 Answer the following. (Any Six)** **12**
- a) What is Combinational logic design?
 - b) What is Verilog HDL?
 - c) What is CPLD?
 - d) What is Multiplexer?
 - e) Define Comparator.
 - f) What is Decoder?
 - g) Define gate level modelling.
 - h) What is PLD?
- Q.3 Answer the following. (Any Three)** **12**
- a) What is the difference between Multiplexer and Demultiplexer.
 - b) Write a short note on PAL.
 - c) Design half adder using K map and realize it using basic gates.
 - d) Write Verilog code for D FF using behavioral modeling style.
- Q.4 Answer the following. (Any Two)** **12**
- a) Design Octal to Binary encoder.
 - b) Explain Operators in Verilog HDL.
 - c) Design Full subtractor using K map and realize it using basic gates.
- Q.5 Answer the following. (Any Two)** **12**
- a) Explain in detail n -bit parallel adder.
 - b) What is synchronous sequential circuit? Differentiate Mealey and Moore machine with exact diagram.
 - c) Explain Ring counter with its timing diagram.

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Research Methodology (2320103)

Day & Date: Thursday, 11-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All Questions are compulsory.
 2) Figure to right indicate full marks.

Q.1 A) Select the correct answer.

08

- 1) An image, perception or concept that is capable of measurement is called _____.
 - a) Scale
 - b) Hypothesis
 - c) Type
 - d) Variable
- 2) In order to pursue the research, _____ is priorly required.
 - a) Developing a research design
 - b) Formulating a research question
 - c) Deciding about the data analysis procedure
 - d) Formulating a research hypothesis
- 3) _____ judge the depth of any research.
 - a) By research title
 - b) By research duration
 - c) By research objectives
 - d) By total expenditure on research
- 4) _____ of the following is not the method of Research.
 - a) Survey
 - b) Historical
 - c) Observation
 - d) Philosophical
- 5) Research is _____.
 - a) Searching again and again
 - b) Finding solution to any problem
 - c) Working in a scientific way to search for truth of any problem
 - d) none of the above
- 6) Survey is a _____ Study.
 - a) Descriptive
 - b) Fact finding
 - c) Analytical
 - d) Systematic
- 7) Cluster sampling, stratified sampling and systematic sampling are type's of _____.
 - a) Direct sampling
 - b) Indirect sampling
 - c) Random sampling
 - d) Non random sampling
- 8) The first page of the research report is _____.
 - a) Appendix
 - b) Bibliography
 - c) Index
 - d) Title page

B) State True or False. 04

- 1) Pie chart is useful for comparing values over categories.
- 2) ANOVA is a one way analysis of variance.
- 3) SPSS is an acronym of Statistical Package for the Social Sciences.
- 4) A complete list of all the sampling units is called sample design.

Q.2 Answer the following. (Any Six) 12

- a) What do you mean by research explain briefly?
- b) How you will ensure the quality in research?
- c) What are the characteristics of research?
- d) What do you mean by Hypothesis?
- e) Define Variable?
- f) What is Layout of the research report?
- g) What are different types of Graphs?
- h) List the types of research?

Q.3 Answer the following. (Any Three) 12

- a) Write objectives of research.
- b) How you will ensure the quality in research?
- c) Write a note on qualitative Data Analysis?
- d) Write a note on methods of collecting primary data.

Q.4 Answer the following. (Any Two) 12

- a) Explain types of research.
- b) Explain characteristics of research.
- c) Explain criteria for selection of research problem.

Q.5 Answer the following. (Any Two) 12

- a) Explain procedure for reviewing the literature.
- b) Explain the steps involved in writing report in detail.
- c) What are the various types of sample design?

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M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Electronics System design (MSC02101)

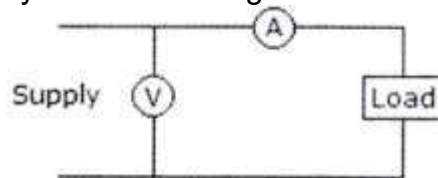
Day & Date: Friday, 05-01-2024
 Time: 03:00 PM To 06:00 PM

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) Signal conditioning circuits used for different sensors consisting of _____.
 a) Voltage attenuating b) Current attenuating
 c) Boosting voltage d) Keeping current zero
- 3) The gain of the buffer amplifier is _____.
 a) less than one b) greater than one
 c) Infinite d) Unity
- 4) LDR is abbreviated as _____.
 a) Light detected resistor b) Luminous dependent resistor
 c) Light determinant resistor d) Light Dependent resistor
- 5) Basic building blocks of Digital multimeter are _____.
 a) Amplifier and oscillator
 b) Op-amp and diode circuits
 c) Rectifier and Schmitt trigger circuits
 d) A/D converter, attenuator, counter etc.
- 6) A quartz crystal is _____.
 a) a chemical transducer
 b) a photoelectric transducer
 c) not a self-generating transducer
 d) a self-generating transducer
- 7) _____ is an example of the negative regulator.
 a) IC 7805 b) IC 7905
 c) IC 7806 d) None of the above
- 8) RC filters are used in _____ oscillator.
 a) twin T b) Wein bridge
 c) crystal d) phase shift

- 9) The oscillator use _____ feedback.
 - a) negative
 - b) current
 - c) positive
 - d) none of above
- 10) Basic requirement of the signal conditioning circuits are
 - a) signal filtering
 - b) electrical isolation
 - c) measurement range selection
 - d) all of the above

B) State true or false.

06

- 1) The resistance of strain gauge increases with increase in temperature.
- 2) Alloy of Nickel copper are Commonly not used in fabrication of strain gauges.
- 3) An electronic voltmeter draws appreciable current from source.
- 4) The good signal conditional provides better isolation.
- 5) A capacitance transducer can be used to measure liquid level.
- 6) AC signal conditioning is used for Capacitive transducer.

Q.2 Answer the following.

16

- a) Write a note on intelligent sensors.
- b) What is need of signal conditioning in instrumentation?
- c) Draw the circuit diagram of $\pm 12V$ power supply using IC 78XX. and 79XX. series.
- d) Draw a circuit diagram of clock circuit using NOT and NAND gate.

Q.3 a) Write a note on Piezoelectric and strain gauge.

10

- b) With functional block diagram discuss the measurement system in brief.

06

Q.4 a) Design the 8:1 MUX using 2:1MUX. Is strobe required for the circuit if yes give its truth table.

10

- b) Explain design of full adder with suitable example.

06

Q.5 a) What are various types of temperature sensors? Explain any one in detail thermocouple.

08

- b) Write short notes on the following.

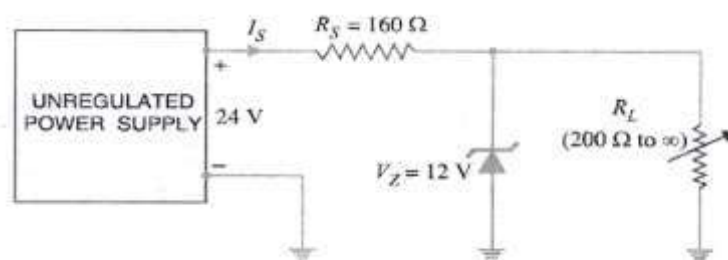
08

- i) pH sensor
- ii) LDR

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) Design Astable multivibrator using Op-amp to generate 1KHz frequency with amplitude of 8 volts. Use suitable power supply.

06

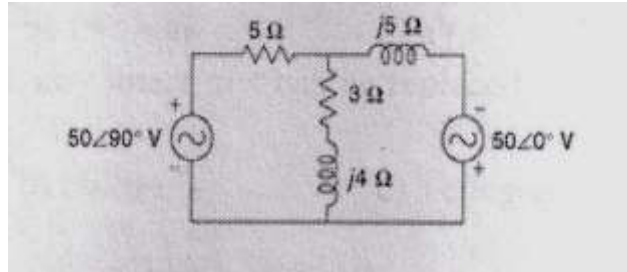
- Q.7** a) Describe the design procedure for the digital multimeter. **08**
- b) Draw the basic block diagram of the signal conditioning circuit and explain it in brief. **08**

Q.5 Answer the following.

- a) Find the Laplace transform of following: **08**
 i) $1 - e^{-t}/t$
 ii) $e^{-3t}t^4$
 b) Explain Impedance and behaviour of R, L and C in series resonant circuit **08**
 in detail.

Q.6 Answer the following.

- a) Explain superposition theorem. Find the current through $3+j4 \Omega$ impedance for the below network. **10**



- b) State and Prove: initial and final value theorems of Laplace Transform. **06**

Q.7 Answer the following.

- a) Test whether $(S) = S+3/S+1$ is a positive real function. **08**
 b) Explain any two removal operations of elementary synthesis operation. **08**

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M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Microcontrollers and Interfacing (MSC02108)

Day & Date: Thursday, 11-01-2024
 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.No.3 to Q.No.7.
 3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative.

10

- 1) PIC-16F877A is an _____ bit microcontroller.
 - a) 8
 - b) 16
 - c) 32
 - d) 64
- 2) PIC stands for _____.
 - a) Peripheral Internal Controller
 - b) Peripheral Interface Controller
 - c) Pipelined Interface Controller
 - d) Pipelined Internal Controller
- 3) _____ are used for special purposes and they cannot be used as normal registers.
 - a) SFR
 - b) GPR
 - c) PSR
 - d) BSR
- 4) The instruction set of PIC microcontroller consists of just _____ instructions.
 - a) 111
 - b) 100
 - c) 35
 - d) 53
- 5) The Timer-0 module is a _____ bit timer/counter.
 - a) 8
 - b) 4
 - c) 2
 - d) 16
- 6) _____ is a data direction register for input and output.
 - a) TIRS
 - b) TRIS
 - c) TSIR
 - d) All of the above
- 7) The conversion of an analog input signal results in a _____ bit digital number.
 - a) 8
 - b) 16
 - c) 12
 - d) 10
- 8) The PIC 16F877A has _____ bytes EEPROM Data Memory.
 - a) 256
 - b) 128
 - c) 512
 - d) 1024

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

Day & Date: Monday, 18-12-2023
 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) The term hysteresis is associated with _____ control.
 - a) P
 - b) I
 - c) ON-OFF
 - d) D
- 2) A system with transfer function $[(2S/4S) + 1]$ is of _____ order.
 - a) 2nd
 - b) 3rd
 - c) 1st
 - d) 4th
- 3) The key advantage of PI controller is that it eliminates the _____ signal.
 - a) Reference
 - b) offset
 - c) actuating
 - d) control
- 4) Control system is a system in which the output is controlled by varying the _____.
 - a) Input
 - b) Output
 - c) Both a & b
 - d) signal
- 5) _____ element is not used in an automatic control system.
 - a) Final control
 - b) Sensor
 - c) Oscillator
 - d) error detector
- 6) Traffic light system is the example of _____ loop control system.
 - a) Closed
 - b) Open
 - c) both a & b
 - d) Error
- 7) In a temperature control system _____ conversion takes place.
 - a) A to D
 - b) D to A
 - c) A to A
 - d) D to D
- 8) The bandwidth for a good control system is _____.
 - a) large
 - b) small
 - c) very small
 - d) none of the above
- 9) _____ is strongest tool to determine the stability and transient response of the system.
 - a) Bode plot
 - b) Nyquist plot
 - c) Root locus
 - d) Routh Hurwitz
- 10) The steady state due to unit step input to a type 1 system is _____.
 - a) 1
 - b) 0
 - c) $1+K_p$
 - d) $1/(1+k_p)$

- B) Write true/false.** **06**
- 1) PD controller can not eliminate the offset.
 - 2) Continuous controller mode has only two position controller and multi-position controller.
 - 3) Field controlled D.C. motor is an open loop control system.
 - 4) Feedback control may introduce instability in a closed loop system.
 - 5) In a control system the output of the controller is given to sensor.
 - 6) Laplace transform of a step function $f(t)$ is $1/s$.

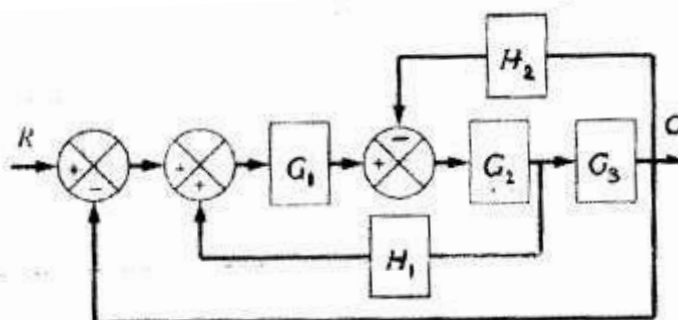
- Q.2 Answer the following.** **16**
- a) What are the basic properties of SFG?
 - b) Explain about the basic elements of a control system.
 - c) Write a short note on ON-OFF controller.
 - d) Discuss the advantages of PID controller.

- Q.3 Answer the following.**
- a) Explain Open loop and closed loop control system with transfer function. **10**
 - b) Write a short note on proportional controller. **06**

- Q.4 Answer the following.**
- a) Define poles and zeroes with general form of transfer function. **08**
 - b) Explain the block diagram reduction technique. **08**

- Q.5 Answer the following.**
- a) The open loop transfer function is given by $G(s)H(s) = \frac{K(1+4s)}{s^2(1+s)(1+2s)}$, Determine the stability of closed loop system. **08**
 - b) What is Effect of feedbacks on Control System performance? Explain in short. **08**

- Q.6 Answer the following.**
- a) For the system represented by the block diagram shown in figure 1. Find $\frac{C}{R}$. **10**



- b) Compare between AC and DC servomotor. **06**

- Q.7 Answer the following.**
- a) Explain Derivative (D) controller and write transfer function with second order system. **08**
 - b) Explain Proportional integral (PI) controller and write transfer function with second order system. **08**

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M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
Electronics Science
Digital Signal Processing (MSC02202)

Day & Date: Tuesday, 19-12-2023
 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) If $x(n)$ is a discrete-time signal, then the value of $x(n)$ at non integer value of 'n' is _____.
 a) Zero
 b) Positive
 c) Negative
 d) Not defined
- 2) The discrete time function defined as $u(n) = n$ for $n \geq 0$; $u(n) = 0$ for $n < 0$ is an _____.
 a) Unit sample signal
 b) Unit step signal
 c) Unit ramp signal
 d) None of the mentioned
- 3) _____ is the condition for a signal $x(n) = Br^n$. where $r = e^{\alpha T}$ to be called as an decaying exponential signal.
 a) $0 < r < \infty$
 b) $0 < r < 1$
 c) $r > 1$
 d) $r < 0$
- 4) The function given by the equation $x(n) = 1$, for $n = 0$; $x(n) = 0$. for $n \neq 0$ is a _____.
 a) Step function
 b) Ramp function
 c) Triangular function
 d) Impulse function
- 5) The Z-Transform $X(z)$ of a discrete time signal $x(n)$ is defined as _____.
 a) $\sum_n = x(n)Z^n$
 b) $\sum_n = x(n)Z^{-n}$
 c) Both a) & b)
 d) None of the mentioned
- 6) _____ 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
- 7) _____ of the following is a frequency domain specification.
 a) $0 \geq 20 \log|H(j\Omega)|$
 b) $20 \log|H(j\Omega)| \geq KP$
 c) $20 \log|H(j\Omega)| \leq KS$
 d) All of the mentioned
- 8) _____ of the following is not a type of discrete system?
 a) Recursive systems
 b) Dynamic systems
 c) Non-causal systems
 d) Non- dynamic systems
- 9) One-sided Z-transform is also known as _____.
 a) Unilateral Z-transform
 b) Bilateral Z-transform
 c) Trilateral Z-transform
 d) None of the above

- 10) _____ type of filters are all pole filters.
- a) Type- I Chebyshev filters
 - b) Type- II Chebyshev filters
 - c) Both (a) and (b)
 - d) None of above

B) Write TRUE or FALSE

06

- 1) ROC is the set of all values of z for which $X(z)$ attains a finite value.
- 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) Power signal is infinite is the characteristic of the power signal
- 6) Linear system satisfies the superposition principle.

Q.2 Answer the following.

16

- a) Explain properties of discrete time signals?
- b) What do you meant by sampling process? State Shannon's sampling theorem.
- c) Define Nyquist rate. What is aliasing effect? How can aliasing be avoided?
- d) Distinguish between discrete signal and discrete signal representation.

Q.3 Answer the following.

- a) What are the different types of operations performed on discrete time signals? **10**
- b) List any four properties of DFT. **06**

Q.4 Answer the following.

- a) Explain types of Discrete Time signals. **10**
- b) What is FFT? Draw the basic butterfly diagram for Radix 2 DITFFT? **06**

Q.5 Answer the following.

- a) Find the DFT of the sequence $x(n) = \{1,1,0,0\}$ **08**
- b) Find the Z- Transform of following $x(n) = n^2 u(n)$ **08**

Q.6 Answer the following.

- a) Define Convolution. Explain properties of discrete convolution. **10**
 - i) Commutative
 - ii) Associative
 - iii) Distributive
- b) Obtain the cascade realization for the system function. **06**

Q.7 Answer the following.

- a) Explain discrete time system properties. **10**
- b) Compare between the IIR and FIR filter. **06**

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M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Process Control (MSC02301)

Day & Date: Friday, 05-01-2024
 Time: 11:00 AM To 02:00 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) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.

10

- 1) Proportional control _____ the response of a control process.
 - a) accelerates
 - b) deaccelerates
 - c) has no effect on
 - d) none of the above
- 2) Standard for hydraulic signal transmission in process control industry is _____ inches.
 - a) 0-2
 - b) 0-5
 - c) 1-5
 - d) 1-2.5
- 3) PD controller can not eliminates the _____.
 - a) reference signal
 - b) actuating signal
 - c) offset
 - d) control signal
- 4) Final control element accepts an input from the _____.
 - a) sensor
 - b) controller
 - c) summing block
 - d) feedback
- 5) The transfer function for a PI controller is _____.
 - a) $K_P + K_D s$
 - b) $K_P + K_I/s$
 - c) K_P
 - d) $K_D s$
- 6) Negative resistance (NR) is a property of some electrical circuits and devices in which an increase in voltage across the device's terminals results in _____.
 - a) decrease in current
 - b) increase in current
 - c) constant current
 - d) zero current
- 7) _____ is element of process control.
 - a) Evaluation
 - b) Measurement
 - c) Resistance
 - d) Both a & b
- 8) The value of steady state error in closed loop control systems is _____.
 - a) Unity
 - b) zero
 - c) Infinity
 - d) unpredictable
- 9) SLPC full form is _____.
 - a) Single load process Control
 - b) Single line product Control
 - c) Single loop process Control
 - d) Single loop process Converter

- 10) The bandwidth for a good control system is _____
- a) very small
 - b) large
 - c) medium
 - d) none of the above

B) State true or false **06**

- 1) DMC has ability to deal with multivariable process.
- 2) Continuous controller mode has only two position controller and multi position controller.
- 3) Analog output scaling is also called as unsealing.
- 4) The PI controller has problem about steady state error.
- 5) The standard for pneumatic signal transmission in process control industry is 3-15 psi
- 6) Feedback control may introduce instability in a closed loop system.

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

- a) Write a short note on ANN.
- b) Explain in short the ON/OFF controller.
- c) Write a short note on element of process dynamics.
- d) What is P controller? Write equation for its output.

Q.3 Answer the following.

- a) Explain Ziegler-Nichols tuning method for process loop tuning. **10**
- b) Write short note on **06**
 - i) Steady state gain
 - ii) Process gain
 - iii) Valve gain

Q.4 Answer the following.

- a) What are the continuous controller modes? Explain one of them in detail **10**
- b) Describe in short feedback and feed forward controller. **06**

Q.5 Answer the following.

- a) Explain Proportional Integral (PID) controller with suitable block diagram. derive the transfer function for it. **10**
- b) Explain self regulating process and non self regulating process. **06**

Q.6 Answer the following.

- a) What is the use of scaling in industries? Explain scaling with example. **08**
- b) What are the different tuning methods for multi-loop control system? **08**

Q.7 Answer the following.

- a) Draw ANN neuron model and explain elements in the model. **08**
- b) Explain Dynamic matrix controller (DMC) in detail. **08**

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M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Microwave Devices and Applications (MSC02302)

Day & Date: Sunday, 07-01-2024
 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) Which of the following device cannot be used a micro wave oscillator?
 - a) IMPTT diode
 - b) P-N Junction diode
 - c) TRAPTT diode
 - d) BARRITT Diode
- 2) In construction and terminology MESFET is similar to _____.
 - a) JFET
 - b) BJT
 - c) PMOS
 - d) NMOS
- 3) A major disadvantage of TRAPATT diode is _____.
 - a) Fabrication is costly
 - b) Low gain
 - c) Low operational bandwidth
 - d) High noise figure
- 4) 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
- 5) Which one of the following microwave devices is used for witching applications?
 - a) PIN diode
 - b) IMPATT diode
 - c) Step recovery diode
 - d) GUNN diode
- 6) MESFET properties can be varied by varying the _____.
 - a) Implant
 - b) Implant concentration
 - c) Structure
 - d) length
- 7) Which one of the following diodes consists only N-type semiconductor materials?
 - a) Pn junction diode
 - b) Both a and b
 - c) Gunn diode
 - d) None
- 8) The number of semiconductor layers in a TRAPATT diode is _____.
 - a) Two
 - b) Four
 - c) Three
 - d) One
- 9) LSA full form is _____.
 - a) light space charge accumulation
 - b) light space charge atom
 - c) limited space charge accumulation
 - d) limited space charge acceleration

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

Day & Date: Tuesday, 09-01-2024
 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) Figures to the right indicate full marks.

Q.1 A) Select the correct answer.

10

- 1) The ARM core uses _____ Architecture.
 - a) RISC
 - b) CISC
 - c) Both
 - d) None of these
- 2) ARM Processor specifically designed for to reduce _____.
 - a) Size
 - b) Power Consumption
 - c) Both a & b
 - d) None of these
- 3) ARM Processor core is a key component of _____ bit embedded system.
 - a) 8
 - b) 16
 - c) 32
 - d) 64
- 4) _____ is the processing of instruction broken down to smaller unit.
 - a) Pipeline
 - b) ALU
 - c) MCU
 - d) All of these
- 5) Register contains _____.
 - a) Address
 - b) Data
 - c) Both a & b
 - d) None of these
- 6) _____ Instruction used to transfer the data between register and memory.
 - a) Load
 - b) Store
 - c) Both a & b
 - d) None of these
- 7) AMBA means _____ architecture.
 - a) Advance microcontroller bus
 - b) Advance machine bus
 - c) Both
 - d) None of these
- 8) _____ is placed between main memory and core.
 - a) Cache
 - b) RAM
 - c) ROM
 - d) All of these
- 9) _____ memory require refreshing.
 - a) SRAM
 - b) DRAM
 - c) PROM
 - d) EPROM
- 10) Application of ARM processor is _____.
 - a) automotive
 - b) consumable
 - c) mobile
 - d) All of these

- B) State true or false.** **06**
- 1) Cache is used to speed up data transfer.
 - 2) SRAM means stable RAM.
 - 3) RISC means Reduced Instruction set computer.
 - 4) BUS is used to communicate between part of the device.
 - 5) Real time systems must have preemptive kernels.
 - 6) ISR stand for interrupt standard routine.
- Q.2 Answer the following.** **16**
- a) What is I2C bus? Write down its main features.
 - b) Write down the main differences between Von Neumann and Harvard architecture.
 - c) Draw the Program Status Register and mention FLAG bits.
 - d) Explain functions of operating systems.
- Q.3 Answer the following.**
- a) Draw and Explain the architectural block diagram of ARM. **08**
 - b) Explain with help of diagram functions of various registers in ARM. **08**
- Q.4 Answer the following.**
- a) Explain in any five instructions of ARM processor with example. **10**
 - b) Differentiate between Traditional OS & Real Time OS. **06**
- Q.5 Answer the following.**
- a) Explain objects(message, queue, pipes, mailbox & event) of RTOS. **10**
 - b) Explain the 3 stage pipeline ARM organization. **06**
- Q.6 Answer the following.**
- a) Explain ARM processor modes. **08**
 - b) Write a note on ARM architecture variants. **08**
- Q.7 Answer the following.**
- a) Explain SPI & CAN Protocol. **10**
 - b) Explain terms : **06**
 - 1) WDT
 - 2) RTC module
 - 3) ADC

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Optical Fiber Communication (MSC02401)

Day & Date: Monday, 18-12-2023
 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) Multiple choice questions. 10

- 1) Which among the following is provided by an optical receiver for the regeneration of data signal with minimum error?
 - a) Photo-diode
 - b) Signal Processing Circuits
 - c) Linear Circuitry
 - d) None of the above
- 2) Which among the following represent/s the measure/s to minimize the inhomogenities for Mie scattering reduction?
 - a) Extrusion Control
 - b) Increase in relative R.I. difference
 - c) Removal of imperfections due to glass manufacturing process
 - d) All of the above
- 3) The fraction of incident photons generated by photodiode of electrons generated collected at detector is known as _____.
 - a) Quantum efficiency
 - b) Absorption coefficient
 - c) Responsivity
 - d) Anger recombination
- 4) The quantum efficiency of photodiode is 40% with wavelength of 0.90×10^{-6} . Determine the responsivity of photodiodes.
 - a) 0.20
 - b) 0.52
 - c) 0.29
 - d) 0.55
- 5) The strip width of injection laser is _____.
 - a) $12 \mu\text{m}$
 - b) $11.5 \mu\text{m}$
 - c) Less than $10 \mu\text{m}$
 - d) $15 \mu\text{m}$
- 6) Raman and Brillouin scattering are usually observed at _____.
 - a) Low optical power densities
 - b) Medium optical power densities
 - c) High optical power densities
 - d) Threshold power densities
- 7) Rayleigh scattering and Mie scattering are the types of _____.
 - a) Linear scattering losses
 - b) Non-linear scattering losses
 - c) Fiber bends losses
 - d) Splicing losses
- 8) The energy-level occupation for a semiconductor in thermal equilibrium is described by the _____.
 - a) Boltzmann distribution function
 - b) Probability distribution function
 - c) Fermi-Dirac distribution function
 - d) Cumulative distribution function

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Power Electronics (MSC02402)

Day & Date: Tuesday, 19-12-2023
 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. No. 3 to Q. No. 7
 3) Figure to right indicate full marks.

Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10

- 1) In the method of phase control, the phase relationship between _____ & _____ is controlled by varying the firing angle.
 - a) supply current, supply voltage
 - b) end of the load current, end of the load voltage
 - c) start of the load current, start of the load voltage
 - d) load current, load voltage
- 2) In a single phase half-wave thyristor circuit with R load $V_s = V_m \sin \omega t$, the maximum value of the load current can be given by _____.
 - a) $2V_m/R$
 - b) V_s/R
 - c) $V_m/2$
 - d) $V_s/2$
- 3) A fully controlled converter uses _____.
 - a) diodes only
 - b) thyristors only
 - c) both diodes and thyristors
 - d) none of the mentioned
- 4) A single phase full controlled bridge converter (B-2) uses _____.
 - a) 4 SCRs and 2 diodes
 - b) 4 SCRs
 - c) 6 SCRs
 - d) 4 SCRs and 2 diodes
- 5) For an SCR, dv/dt protection is achieved through the use of _____.
 - a) RL in series with SCR
 - b) RC in series with
 - c) L in series with
 - d) RC across
- 6) SMPS is used for _____.
 - a) obtaining controlled ac power supply
 - b) obtaining controlled dc power supply
 - c) storage of dc power
 - d) switch from one source to another
- 7) For high power applications _____ are used as static switches whereas for low power applications _____ are used.
 - a) Transistors, SCRs
 - b) SCRs, transistors
 - c) Diodes, transistors
 - d) SCRs, diodes
- 8) A 1-phase half wave diode rectifier with $R = 1 K\Omega$, has input voltage of 240 V. The diode peak current is _____.
 - a) Zero
 - b) 24mA
 - c) 240mA
 - d) 0.24mA

- 9) In a three-phase half wave diode rectifier using 3 diodes, each diode conducts for _____.
- | | |
|----------------|----------------|
| a) 120 degrees | b) 90 degrees |
| c) 180 degrees | d) 360 degrees |
- 10) A thyristor (SCR) is a _____.
- | | |
|-------------------|-----------------|
| a) P-N-P device | b) N-P-N device |
| c) P-N-P-N device | d) P-N device |

B) State whether the following statements are True or False: 06

- 1) An SMPS is frequently used as a power supply in computers.
- 2) In a buck regulator, the output voltage is always less than the input voltage.
- 3) The thyristor is a current-controlled device.
- 4) The more the value of the gate current, the later will be the firing of the device.
- 5) A single-phase half-wave controlled bridge is the simplest and cheapest form of the bridge.
- 6) Dual converter circuits are designed only for three-phase type

Q.2 Answer the following 16

- a) What are the necessary conditions for turning ON a SCR?
- b) What is a step up chopper? Explain in short.
- c) Draw the static VI characteristics of a SCR and explain.
- d) Write a short note on SMPS

Q.3 Answer the following

- a) Draw and describe the circuit diagram of single phase ac voltage controller with RL load. Explain the circuit operation with necessary waveforms. 08
- b) Draw the circuit diagram of buck regulator and explain the operating principle. 08

Q.4 Answer the following

- a) Explain the operating principle of class C commutation technique of SCR with circuit diagram and waveforms. 08
- b) Draw the circuit diagram and explain the working of class E commutation technique of SCR 08

Q.5 Answer the following

- a) Derive the expression for output voltage of single phase bidirectional ac voltage controller with RL load and draw the waveforms. 08
- b) Draw and explain the operating principle of step up chopper with RL load and draw the necessary waveforms 08

Q.6 Answer the following

- a) With the help of circuit diagram and waveforms explain the principle of working of boost converter. 08
- b) Discuss briefly the voltage commutation technique of SCR with circuit diagram and waveforms. 08

Q.7 Answer the following

- a) Explain the class B commutation method of SCR with circuit diagram and waveforms. 08
- b) Discuss the principle of operation of Buck-boost converter. 08

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
PLC and SCADA (MSC02403)

Day & Date: Wednesday, 20-12-2023
 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) Choose the correct alternative. 10

- 1) _____ is not a component of SCADA system.
 - a) Sparger controller
 - b) Output system
 - c) Database server
 - d) None of the above
- 2) The standard form of DCS is _____.
 - a) Distributed Control System
 - b) Digital Control System
 - c) Distributed Code System
 - d) Distributed Communication System
- 3) The first generation SCADA systems were developed or designed in _____.
 - a) 1970
 - b) 1960
 - c) 1980
 - d) 1990
- 4) A PLC would be used for the automation of industrial _____.
 - a) Electromechanical processes
 - b) Electrochemical processes
 - c) Recurrent process
 - d) Electromagnetic process
- 5) _____ program is used for functions as counters, timers, shift registers, and math operation in PLC.
 - a) HTML
 - b) Logic function programming
 - c) Ladder Logic
 - d) C programming
- 6) _____ is the type of control in SCADA.
 - a) Online control
 - b) Digital control
 - b) Analog control
 - d) Supervisory control
- 7) _____ are the components of traditional SCADA system.
 - a) Remote Telemetry Unit
 - b) Communication system
 - c) Central Station
 - d) All of the above
- 8) _____ are the components of modern SCADA system.
 - a) Human Machine Interface
 - b) SCADA servers
 - b) SCADA clients
 - d) All of the above
- 9) The heart of the SCADA system is _____.
 - a) CPU
 - b) PLC
 - c) I/O task
 - d) Relays

- 10) 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

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

- 1) The second generation SCADA systems were developed or designed in 1960.
- 2) TWO type of control systems are there for SCADA systems.
- 3) Three types of network configurations does SCADA system may use.
- 4) Three ways that SCADA system can get access to the cloud.
- 5) The supervisory control and data acquisition system Stores data
Monitors data Controls data.
- 6) The master terminal unit in SCADA system can be Web server, Real time decision maker, Analyzes data, data logging.

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

- a) Write short note on fiber optic cable parameter.
- b) Draw the block diagram of PLC and explain the function of CPU.
- c) Write a ladder program for AND gate. Draw its truth table.
- d) Differentiate between SCADA and PLC.

Q.3 Answer the following.

a) What is CAN Protocol? Explain it in details.

10

b) Differentiate between Open loop and closed loop.

06**Q.4 Answer the following.**

a) Explain the following guided media in short with advantages and disadvantages.

08

- i) Twisted Pair ii) Coaxial

b) List the Layers of OSI Model? Describe the Functions of Transport, Session and Application Layer.

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

a) Explain the functionality of RS-232 standard serial interface with neat diagram.

08

b) Write a short note on various Connector standards.

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

a) List the typical parts of DCS system hardware. Explain the function of workstation.

10

b) Explain PLC selection and configuration for any one process applications.

06**Q.7 Answer the following.**

a) What is HART Protocol? Explain the overview of HART in details.

10

b) Compare MODBUS and PROFIBUS on any six points.

06

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS SCIENCE
Internet of Things (IoT) (MSC02406)

Day & Date: Thursday, 21-12-2023
 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 Q. No. 7
 3) Figure to right indicate full marks.

Q.1 A) Select the correct answer. 10

- 1) What IoT collects?
 - a) Device data
 - b) Machine generated data
 - c) Sensor data
 - d) Human generated data
- 2) Which of the following protocol is used to link all the devices in the IoT?
 - a) HTTP
 - b) UDP
 - c) Network
 - d) TCP/IP
- 3) What is the role of Cloud in smart grid architecture of IoT?
 - a) Security
 - b) Collect data
 - c) Manage data
 - d) Store data
- 4) What is the component of an IoT system that executes a program?
 - a) A sensor
 - b) A microcontroller
 - c) An actuator
 - d) ADC converter
- 5) Which programming language is used by Arduino IDE IoT software for writing codes?
 - a) Python
 - b) Java
 - c) C/C++
 - d) JavaScript
- 6) How many numbers of elements in the Open IoT Architecture?
 - a) 3 elements
 - b) 7 elements
 - c) 8 elements
 - d) 6 elements
- 7) What is the full form of the LPWAN?
 - a) Low Protocol Wide Area Network
 - b) Low Power Wide Area Network
 - c) Long Protocol Wide Area Network
 - d) Long Power Wide Area Network
- 8) An IoT network is a collection of _____ devices.
 - a) Signal
 - b) Machine to Machine
 - c) Interconnected
 - d) Network to Network
- 9) What is the full form of the MQTT?
 - a) Multi-Queue Telemetry Things
 - b) Multiple Queue Telemetry Things
 - c) Message Queue Telemetry Things
 - d) Message Queue Telemetry Transport

- 10) What is MQTT primarily used for?
- User communication
 - System transfer
 - Machine to Machine Communication
 - Create connection

B) State True or False. 06

- CoAP can be thought of as an alternative to HTTP.
- MQTT is a lightweight protocol, which makes it suitable for IoT applications.
- RFID is inexpensive and uses very little power.
- The phrase 'Internet of Things' was coined by Kevin Ashton an expert on digital innovation in 1999.
- IoE stands for Internet of Environment.
- Smart farming through the use of IoT technologies will help farmers to reduce generated wastes and enhance productivity.

Q.2 Answer the following. 16

- Explain advantages of IoT.
- What is UAV network?
- Explain sensor network.
- What is cloud computing?

Q.3 Answer the following.

- Explain IoT communication model in detail. 08
- Explain any two wireless communication IoT Protocols. 08

Q.4 Answer the following.

- What is sensor? Explain need, classification & applications of sensor. 08
- What is actuator? Explain need, classification & applications of sensor. 08

Q.5 Answer the following.

- Explain block diagram of cloud computing? 08
- What is Raspberry Pi? Write features of Raspberry Pi. 08

Q.6 Answer the following.

- Explain security in cloud computing. 08
- Explain any one of the Home IoT system implementation in detail. 08

Q.7 Answer the following.

- Explain applications of IoT. 08
- Explain characteristics of IoT. 08