

Total No. of Questions : 5]

SEAT No. :

PE-4722

[Total No. of Pages : 3

[6518]-1
M.Sc. - I
ELECTRONIC SCIENCE
ELS-501-MJ : Analog System Design
(2023 Credit Pattern) (Semester - I) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Q. 1 is compulsory*
- 2) *Solve any five questions from Q. 2 to Q. 7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat diagram must draw wherever necessary.*

Q1) Solve any Five of the following :

[10]

- a) Draw hybrid equivalent circuit of common emitter configuration.
- b) State advantages and disadvantages of tuned amplifier (any two)
- c) A certain X-cut quartz crystal resonates at 500 kHz. It has equivalent inductance of 4.2H and an equivalent capacitance of 0.03 pF. If it's equivalent resistance is 500Ω , calculate it's Q factor.
- d) Draw equivalent circuit of an op-amp.
- e) Draw VI characteristics of diode.
- f) For a JFET. $V_{GS} = -3V$, $V_p = -6V$ and $I_{DSS} = 10mA$, calculate I_D .

P.T.O.

- Q2) a) i)** Explain the CB,CE,CC configuration of BJT.Which of them mostly used in amplifier? **[4]**
- ii)** Explain the difference between dc equivalent and ac equivalent circuit. **[3]**
- b)** With proper diagram of an instrumentation amplifier using three op-amp,deduce an expression for it's output voltage **[5]**
- Q3) a) i)** Explain the basic building block diagram of PLL.List different application of PLL. **[4]**
- ii)** Explain the effect of temperature on VI characteristics of p-n junction diode. **[3]**
- b)** Draw a neat diagram of colpitt oscillator, Explain its working and derive the equation for frequency of oscillations. **[5]**
- Q4) a) i)** Draw the circuit diagram of transistor amplifier in CE configuration. Derive the expression for voltage gain. **[4]**
- ii)** Draw block diagram of an op-amp. Explain the purpose of each block in short. **[3]**
- b)** Explain the working of n channel MOSFET in depletion and enhancement mode. Derive the equation for drain current. **[5]**
- Q5) a) i)** Distinguish between RC phase shift and wein bridge oscillators.**[4]**
- ii)** Explain different applications of FET (any 2) **[3]**
- b)** Explain and compare the different methods of coupling used to couple stages of multistage amplifier. **[5]**
- Q6) a) i)** Explain the practical design consideration of an integrator circuit. Draw circuit diagram of practical integrator. **[4]**
- ii)** With the help of necessary waveforms, explain step response of amplifier. **[3]**
- b)** What are important factors in choosing certain type of oscillator? **[5]**

Q7) Write short note on any two of the following :

- a) i) Diode in clipper circuit. [3]
- ii) High frequency equivalent circuit of mosfet [3]
- b) i) Frequency response of an op-amp. [3]
- ii) Break down mechanism in diode. [3]
- c) i) Close loop configuration of an-op-amp. [3]
- ii) Multistage tuned amplifier. [3]



Total No. of Questions : 7]

SEAT No. :

PE-4723

[Total No. of Pages : 3

[6518]-2

M.Sc. - I

ELECTRONIC SCIENCE

**ELS-502-MJ : Advanced Digital System Design Using Verilog
(2023 Pattern) (Semester - I) (4 Credits)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) Attempt any Five of the following :

[10]

- a) What is role of memories in PLDs?
- b) Write the inputs, outputs and types of output :
 - i) PAL 10L8 ii) PLA 16 H8
- c) State the components of Verilog module.
- d) What is state table and excitation table.
- e) Write verilog code for half adder.
- f) Comment : EXOR gate is used for parity generator.

P.T.O.

Q2) Attempt the following :

- a) i) Implement the Boolean function using PAL device : [4]

$$F_1 = \overline{A}BC\overline{D} + \overline{A}\overline{B}CD + A\overline{B}\overline{C}D$$

$$F_2 = \overline{A}B\overline{C} + \overline{A}BC + A\overline{B}C + A\overline{B}\overline{C}$$

- ii) Write the advantages of PLDs over fixed function ICs. [3]
- b) Explain conditional operator, replication operator and arithmetic operator in Verilog. [5]

Q3) Attempt the following :

- a) i) Compare synchronous and asynchronous counter. [4]
- ii) Draw the block diagram of PLA and explain it in short. [3]
- b) Design decimal to BCD encoder and draw its logic circuit. [5]

Q4) Attempt the following :

- a) i) Draw the 6-transistor RAM cell and explain it [4]
- ii) Write the verilog code for JK Flip - Flop. [3]
- b) Explain blocking and non - blocking assignment in verilog. [5]

Q5) Attempt the following :

- a) i) Explain one digit BCD adder using logic diagram. [4]
- ii) Compare CPLD and FDGA. [3]
- b) What is shift register? Explain how ring counter is implemented using shift register. [5]

Q6) Attempt the following :

- a) i) Draw the architecture of CPLD and explain it. [4]
- ii) Design the 2-bit magnitude comparator [3]
- b) What is asynchronous counter? Explain 4-bit asynchronous counter using neat diagram. [4]

Q7) Attempt any two of the following :

- a) Draw the logic diagram and truth table of 1.4 demultiplexer. Write verilog code for 1.4 demultiplexer. [6]
- b) Explain priority encoder using neat diagram write its advantages. [6]
- c) What is FSM? Explain design steps of [6]
FSM: Traffic Light Controller.



Total No. of Questions : 5]

SEAT No. :

PE-4724

[Total No. of Pages : 2

[6518]-3

M.Sc. - I

ELECTRONIC SCIENCE

ELS 503 MJ : Mathematical Methods in Electronics
(NEP) (2023 Pattern) (Semester - I) (Paper - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Solve any five of the following :

[5]

- a) What is mean by periodic signal?
- b) Define transfer function.
- c) Write a Laplace transform of e^{at} .
- d) Define unit impulse function.
- e) Which command is used in MATLAB for differentiation?
- f) What 'ode45' command will do in MATLAB?

Q2) Answer the following :

- a) i) What are even and odd signals? [2]
- ii) Find the inverse Laplace transform of [4]

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

- b) What is difference between digital filter and analog filter? [4]

P.T.O.

Q3) Answer the following :

- a) i) What are the limitations of fourier transform [2]
- ii) Write a MATLAB program to find Laplace transform of
 $f(t) = \sin(2t) \cos(2t)$ [4]
- b) Explain Z-transform and Inverse Z-transform. [4]

Q4) Answer the following :

- a) i) What is the significance of ROC in Z-transform? [2]
- ii) Find a current flowing through the series RL network using Laplace transform. [4]
- b) Write a MATLAB programme to find poles & zeros of transfer function. [4]

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

Q5) Write a short note on any four of the following : [10]

- a) List any five properties of Z-transform.
- b) Calculate the periodicity of
 $f(t) = e^{i300\pi t}$
- c) Explain linearity property of Laplace transform
- d) Explain the syntax of following MATLAB command
 - i) bar
 - ii) hist
 - iii) line
- e) State and explain sampling theorem.
- f) Define continuous time signal and give its classification



Total No. of Questions : 5]

SEAT No. :

PE-4725

[Total No. of Pages : 2

[6518]-4

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELS - 510 MJ : Fundamentals of Instrumentation System

(2023 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Solve any five of the following:

[5]

- a) Define standard deviation.
- b) What is repeatability?
- c) Give classification of measuring instruments with suitable example.
- d) Write the use of LCR meter.
- e) What is active transducer? Give example.
- f) State the instruments for energy measurement.

Q2) Answer the following:

- a) What are the basic blocks of generalized instrumentation system? Draw block diagram and explain function of each block. **[6]**
- b) Explain Wheatstone bridge method for determining of measurement of resistor. **[4]**

P.T.O.

Q3) Answer the following:

- a) Explain working principle of CRO with suitable diagram. List specifications of it. [6]
- b) Discuss the primary capacitance standards. [4]

Q4) Answer the following:

- a) Explain the following terms. [6]
 - i) Linearity
 - ii) Resolution

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

- b) Describe Input Output configuration of measurement system in brief.[4]

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

- a) Digital frequency meter.
- b) Null type instruments.
- c) Observational Errors.
- d) Analog Multimeters.
- e) Types of standards of measurement.
- f) Analog and Digital modes of measurement.



Total No. of Questions : 5]

SEAT No. :

PE-4726

[Total No. of Pages : 2

[6518]-5
M.Sc. - I
ELECTRONIC SCIENCE
ELS 511 MJ : Introduction to Artificial Intelligence and
Machine Learning
(2023 Pattern) (Credit-2) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Use of non-programmable calculator is allowed.*

Q1) Solve any five of the following :

[5]

- a) What do you mean by Turing Test?
- b) State different types of learning.
- c) Feature scaling important in Algorithm like KNN comment.
- d) State any two Application of AI.
- e) Give difference between AI and machine learning.
- f) Why has AI evolved to include emotional intelligence in some Application?

Q2) Answer the following :

- a) What are the key terminologies and properties of search Algorithm in AI? **[6]**
- b) Describe the functionality of support vector machine and the role of kernel function. **[4]**

P.T.O.

Q3) Answer the following :

- a) Explain the concept of state space and its importance in solving AI problem. [6]
- b) What is the significance of grouping and grading mechanism in machine learning? [4]

Q4) Answer the following :

- a) Provide comparative analysis of k-means and k modes clustering highlighting their optimal use cases. [6]
- b) What criteria define a rational agent in AI and how does it apply to decision making process? [4]

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

- a) VC Dimension
- b) PAC learning
- c) Supervised learning
- d) Probabilistic models
- e) Multilayer perception
- f) ID3



Total No. of Questions : 5]

SEAT No. :

PE-4727

[Total No. of Pages : 2

[6518]-6

M.Sc. (Part - I)

ELECTRONIC SCIENCE

**ELS-512-MJ : Fundamentals and Applications of PIC microcontroller
(NEP 2023 Pattern) (Semester - I) (Credit System)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Answer any Five of the following :

[1 × 5 = 5]

- a) State the pin function of RS in LCD display interface.
- b) What is step size for 8-bit ADC if vref is 2.56?
- c) How many timer registers have in PIC18?
- d) Find the Rom memory address for PIC18 with 4KB.
- e) State the function of program counter.
- f) What is the role of PINx register?

Q2) Answer the following :

[10]

- a) i) Name the factors affecting the delay length using timers? **[2]**
ii) Write a 'C' program to toggle all bits of PORTB continuously. **[4]**
- b) Draw and explain status register format of PIC18. **[4]**

P.T.O.

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

- a) i) State any four features of PIC18. **[2]**
- ii) Write programming steps for 8-bit mode of Timero **[4]**
- b) Draw interfacing diagram of DC motor to PIC18 and write PIC18 'C' Program to rotate motor clockwise direction **[4]**

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

- a) i) Find the contents of PORT B after the following 'C' program code in each case **[2]**
I) $\text{PORT B} = 0 \times 37 \ \& \ 0 \times \text{BC}$ II) $\text{PORTB} = 0 \times 9\text{A} > 3$.
- ii) Explain with format diagram timero control register (TOCON) **[4]**
- b) Draw the DAC interface diagram with PIC18 and write a 'C' program to generate square wave. **[4]**

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

- a) Interrupt sources of PIC18.
- b) LM 35 Interfacing with PIC18
- c) Features of RISC architecture
- d) Data memory organization
- e) Format of receive status and control register (RCSTA)
- f) Concept of pipelining



Total No. of Questions : 7]

SEAT No. :

PE-4728

[Total No. of Pages : 2

[6518]-7
M.Sc.
ELECTRONIC SCIENCE
STS-541-MJ : Research Methodology
(2023 Credit Pattern) (Semester - I) (Major core)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) Attempt any Five of the following :

[10]

- a) What is research paper?
- b) What do you mean by presentation?
- c) Define research methodology.
- d) Define the term patent.
- e) What do you mean by questionnaire?
- f) Define error and noise analysis.

Q2) Attempt the following :

- a) Explain ancient Indian research methodology applications in brief. **[7]**
- b) Write in brief field data collection in research. **[5]**

P.T.O.

Q3) Attempt the following :

- a) Write case study based note on selection of research topic. [7]
- b) Explain in brief exploratory and confirmatory research. [5]

Q4) Attempt the following :

- a) What is mean by thesis? Explain in brief various steps for writing thesis?[7]
- b) Describe any one identified research methods in brief. [5]

Q5) Attempt the following :

- a) Explain case study based with suitable points that how laboratory records maintain. [7]
- b) Explain with the help of suitable point effective verbal and non-verbal communication. [5]

Q6) Attempt the following :

- a) What is statistical analysis? Write its significance for research in brief.[7]
- b) Explain in brief Indian, Egyptian Greek ideas methodology. [5]

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

- a) Research Proposal
- b) History of research
- c) Safety in laboratories



Total No. of Questions : 7]

SEAT No. :

PE-4729

[Total No. of Pages : 2

[6518]-21

M.Sc. - I

ELECTRONIC SCIENCE

ELS 551 MJ : Modern Communication Systems
(2023 Pattern) (Credit - 4) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Attempt any five of the following :

[10]

- a) What is isotropic radiator?
- b) Write the applications of sleeve antenna.
- c) State : pulse modulation. What are its types?
- d) Define : RZ and NRZ code.
- e) Explain the concept of frequency reuse.
- f) Comment : visible light communication system.

Q2) Attempt the following :

- a) i) Explain Yagi-Uda antenna using neat diagram. [4]
ii) Write a short note on near zone and far zone. [3]
- b) Explain delta modulation using neat block diagram. What is granular noise? [5]

Q3) Attempt the following :

- a) i) Explain the vehicular network characteristics in detail. [4]
ii) Write a note on lens antenna. [3]
- b) What is QAM? Explain 8-QAM using neat block diagram. [5]

Q4) Attempt the following :

- a) i) Write short note on horn antenna and log periodic antenna. [4]
ii) Explain M-ary coding with example. [3]
- b) Draw the architecture of GSM and explain it. [5]

P.T.O.

Q5) Attempt the following :

- a) i) Explain the cell splitting and cell sectoring in cellular phone system. [4]
- ii) Write a note on any three antenna parameters. [3]
- b) Explain 6G network in complete detail. [5]

Q6) Attempt the following :

- a) i) What is remote sensing antenna and satellite antenna? Explain the working of satellite antenna. [4]
- ii) Comment on cellular phone system. [3]
- b) Explain DSRC protocol in detail. [5]

Q7) Attempt any two of the following :

- a) Explain FSK using neat block diagram. Compare ASK and FSK. [6]
- b) Write detail note on use of satellite in DTH and cable TV. [6]
- c) Explain IEEE 802.11p wave standard. Write its advantages and applications. [6]



Total No. of Questions : 7]

SEAT No. :

PE-4730

[Total No. of Pages : 2

[6518]-22
M.Sc.
ELECTRONIC SCIENCE
ELS-552-MJ : Control Systems
(2023 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Q.2 to Q.7 carry equal marks.
- 4) Neat diagram must draw wherever necessary.

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

- a) What is canonical system?
- b) What are the advantages of closed loop system?
- c) Define special cases of Routh Hurwitz criteria.
- d) Define relative stability of control system.
- e) Determine transfer function of low pass filter.
- f) What do you meant by process Loop tuning. List its methods?

Q2) a) i) Explain application of control system in paper tension control system for winding. **[4]**

ii) Consider a control system with $G(s)H(s) = \frac{K}{s(s+2)}$. Obtain the nature of root locus. **[3]**

b) Explain adaptive control system with suitable example. **[5]**

Q3) a) i) With the help of block diagram explain room temperature control system. **[4]**

ii) List advantages of Ladder diagram. **[3]**

b) A unity Feedback control system has $G(s) = \frac{K}{s(s+10)(s^2+4s+5)}$.

Determine range of K using R-H criteria for closed loop system to be stable. **[5]**

P.T.O.

- Q4)** a) i) Explain critical rules for block diagram reduction. [4]
 ii) State type of recorder. Explain any one type. [3]
 b) Compare performance of proportional, integral and derivative control system. [5]
- Q5)** a) i) Define root locus for a control system. State and explain angle and magnitude conditions for a point to be on the root locus. [4]
 ii) What are minimum area and quarter amplitude criteria for control system evaluation? [3]
 b) With the help of circuit diagram explain PID controller. Explain its advantages. [5]
- Q6)** a) i) Level measurement in a symptank is provided by a trunsducer scaled as 0.2V/m. A pump is to be turned on by application of + 5V when the sump level exceeds 2.0m. The pump is to be turned back off when the sump level drops to 1.5m. Develop a two position controller. [4]
 ii) What is Bode plot? Draw Bode plot for $G(s) = \frac{K}{s^n}$. [3]
 b) Write short note on fuzzy logic controller [5]
- Q7)** Write short note on any two of the following : [12]
 a) Standard graphic symbol for process control and instrumentations.
 b) SCADA.
 c) Nyquist plot.



Total No. of Questions : 5]

SEAT No. :

PE-4731

[Total No. of Pages : 2

[6518]-23

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELS - 553 MJ : Industrial Automation

(2023 NEP Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any 3 questions from Q.2 to Q.5
- 3) Questions 2 to 5 carry equal marks.
- 4) Neat diagrams must draw wherever necessary.

Q1) Answer any five of the following:

[5 × 1 = 5]

- a) What are benefits of automation?
- b) What is Function of PLC out put module?
- c) State classification of PLC based on types.
- d) List parts of Ladder diagram.
- e) State any four application area where PLC is used.
- f) Draw Ladder diagram for Ex-or gate.

Q2) Answer the following:

[10]

- a) Design ladder logic for 2 way traffic light control system. **[6]**
- b) Distinguish between compact and modular PLC. **[4]**

Q3) Answer the following:

[10]

- a) Explain processor memory organisation of PLC. **[6]**
- b) Design a ladder logic to control the level of a water storage tank by turning a discharge pump ON and OFF based on low and high levels (Auto mode). **[4]**

P.T.O.

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

a) List manufacturing companies of PLCs. Explain its selection criteria. **[6]**

b) Draw a ladder diagram for a two motor system having following conditions. **[4]**

i) The start switch starts motor 1 and 2.

ii) The stop switch stop motor 1 first after 15 seconds motor 2 stops.

Q5) Write short note on any Four of the following. **[10]**

a) Scan cycle

b) Input Field devices

c) On timer (T_{ON})

d) Up counter

e) Sequencer

f) Comparison instructions in PLC.



Total No. of Questions : 5]

SEAT No. :

PE-4732

[Total No. of Pages : 2

[6518]-24
M.Sc. (Part - I)
ELECTRONIC SCIENCE
ELS-560-MJ : Instrumentation Systems and Applications
(2023 Pattern) (Semester - II) (Credit System)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve Any Five of the following :

[5]

- a) Write the basic principle of thermocouple.
- b) Name the sensor used for realtime fuel level monitoring in automation.
- c) What is the role of a strain gauge in a load cell?
- d) Give one advantage of optical fiber sensors in industrial applications.
- e) Write the purpose of a dielectric soil moisture sensor.
- f) Define the function of an instrumentation amplifier in sensor systems.

Q2) Attempt the following :

- a) Explain data acquisition system. Write its significance. **[6]**
- b) Describe different types of pressure sensors with its working principle and applications. **[4]**

P.T.O.

Q3) Attempt the following :

- a) Explain the concept of IoT-based health care system with a block diagram. [6]
- b) Justify the use of Hall effect sensor for speed measurement over optical encoders. [4]

Q4) Attempt the following :

- a) Discuss the key components and importance of IoT-based engine management system in automobiles. [6]
- b) Why is calibration necessary for RTD in precision temperature measurement? [4]

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

- a) Humidity sensors in agriculture.
- b) Capacitive proximity sensors.
- c) Advantages of piezoelectric sensors.
- d) Working of ultrasonic flow sensor.
- e) Importance of non-contact temperature measurement in medical applications.
- f) Optical fiber sensors.



Total No. of Questions : 5]

SEAT No. :

PE-4733

[Total No. of Pages : 2

[6518]-25

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELS - 561 MJ : Applications of Artificial Intelligence and Machine Learning

(2023 Credit Pattern) (NEP) (Semester - II) (Credit - 2)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any 3 questions from Q.2 to Q.5
- 3) Questions 2 to 5 carry equal marks.
- 4) Neat diagrams must be drawn whenever necessary.
- 5) Use of non-programmable calculator is allowed.

Q1) Solve any five of the following:

[5 × 1 = 5]

- a) State types of Reasoning in AI.
- b) What is the primary function of a knowledge based in AI?
- c) In what situation would backward chaining be preferable over forward chaining in AI reasoning?
- d) Define active reinforcement learning?
- e) How does temporal - difference learning differ from dynamic programming?
- f) What is binomial distribution?

Q2) Answer the following:

- a) Describe the basics of sampling theory in machine learning focusing on error estimation & estimating binomial properties. [6]
- b) Write a short note on Inference. [4]

P.T.O.

Q3) Answer the following:

- a) Explain the concept of nearest neighbor methods in machine learning, including nearest neighbor smoothing & the efficient computation of distances using KD - trees. [6]
- b) What are the key components of knowledge based agents architecture? [4]

Q4) Answer the following:

- a) Explain the Expectation maximization Algorithm & it's role in Gaussian mixture models. [6]
- b) How do knowledge based agents handle uncertainty in their reasoning processes? [4]

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

- a) First order logic
- b) Variance
- c) Model combination schemes
- d) Probabilistic reasoning
- e) Error correcting output codes
- f) AdaBoost



Total No. of Questions : 5]

SEAT No. :

PE-4734

[Total No. of Pages : 2

[6518]-26
M.Sc. I
ELECTRONIC SCIENCE
ELS-562-MJ : Fundamentals and Applications of AVR
Microcontroller
(2023 Credit Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*

Q1) Answer any five of the following :

[5 × 1 = 5]

- a) Define the resolution of ADC.
- b) Write the pin function of SDA and SCL pins of AVR32.
- c) Name the factors that can affect the delay length?
- d) What is the role of PINx register?
- e) Name the current driver IC used to interface DC motor with AVR32.
- f) What do RISC and CISC stand for?

Q2) Answer the following :

[10]

- a) i) Draw the interfacing diagram of LM35 with AVR32. **[2]**
ii) Write the step to program timer0 in normal mode. **[4]**
- b) Draw and explain the block diagram of AT mega32. **[4]**

Q3) Answer the following :

[10]

- a) i) Write a 'C' program to read the PORT A and send it to PORT B continuously. **[2]**
ii) Draw the DAC interface diagram with AVR32 and write 'C' program code for square wave. **[4]**
- b) Draw and explain 8-bit the status register (SREG). **[4]**

P.T.O.

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

- a) i) State the function of RS, RW and En pins of LCD. **[2]**
ii) Explain the data and program memory organization of AVR32. **[4]**
- b) Write an AVR32 'C' program to convert packed BCD 0x29 to ASCII and display the bytes on PORT B and PORT C. **[4]**

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

- a) Features of AVR32.
- b) Bit wise shift operation in AVR32.
- c) General purpose registers.
- d) The 8-bit format of TIFR.
- e) Comparison of AVR32 with other AVR microcontroller.
- f) Program steps to transfer data serially in AVR32.



Total No. of Questions : 7]

SEAT No. :

PE-4735

[Total No. of Pages : 2

[6518]-31

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS - 601 MJ : Electromagnetic And Microwaves (EAM)

(2023 Credit Pattern) (NEP) (Semester - III)(4 Credit)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any 5 questions from Q.2 to Q.7
- 3) Figures to the right indicate full marks.
- 4) Color pencils/pens other than red color are allowed to use.
- 5) Use of calculator is allowed.

Q1) Solve any five of the following:

[5 × 2 = 10]

- a) Define : Electromagnetic wave.
- b) What is the frequency range and wavelength range of microwaves?
- c) Define : curl and divergence
- d) State Gauss's law equation
- e) What is SWR?
- f) What is the concept of wave guide?

Q2) Attempt the following:

[12]

- a) i) List and explain the types of transmission lines. [3]
- ii) How I) optical fibers and II) Circular waveguides works? [4]
- b) Explain single and double stub matching techniques. [5]

Q3) Attempt the following:

[12]

- a) i) What is the meaning of "stub" in single stub matching? Why single stub matching is called so? [3]
- ii) Explain the polar form of a complex number. [4]
- b) Explain with diagrams the concept of Twists and Magic Tees. [5]

P.T.O.

Q4) Attempt the following: [12]

- a) i) Explain micro strip lines. [3]
- ii) Write a note on Phase Velocity. [4]
- b) Explain Smith chart construction and Applications in details. [5]

Q5) Attempt the following: [12]

- a) i) What is Rectangular Wave guides? [3]
- ii) Explain Cylindrical magnetron. [4]
- b) Explain construction and working of Gunn Diode. [5]

Q6) Attempt the following: [12]

- a) i) What is
 - I) Line Impedance
 - II) Normalized Impedance
 - III) Admittance [3]
- ii) Why are reflection and transmission coefficients are important in Wave Propagation? [4]
- b) Write a note on Klystron. [5]

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

- a) Applications of Microwaves.
- b) Coupled cavity TWT and Helix .TWT.
- c) Maxwell's equations and their physical meaning.



Total No. of Questions : 7]

SEAT No. :

PE-4736

[Total No. of Pages : 2

[6518]-32
M.Sc. (Part - II)
ELECTRONIC SCIENCE
ELS-602-MJ : Foundation of Semiconductor Devices
(NEP) (2023 Pattern) (Credit 4) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) Solve Any Five of the following :

[5]

- a) What is resistivity?
- b) “FET is unipolar device” comment.
- c) What are the advantages of PLDs?
- d) Explain the meaning of contact potential.
- e) For JFET $V_{GS} = -3V$, $V_p = -6V$ & $I_{DSS} = 10mA$, calculate I_D .
- f) What is effective mass of an electron?

Q2) Answer the following :

- a) Discuss how space charge region is formed at the P-N Junction. **[7]**
- b) Explain Eber-Moll model for NPN BJT. **[5]**

P.T.O.

Q3) Answer the following :

- a) Explain energy band diagram in MOS capacitor with N type substrate in Accumulation, Depletion and Inversion mode. [7]
- b) Draw the diagram indicating Fermi energy level for [5]
 - i) Intrinsic Semiconductor
 - ii) N-type semiconductor
 - iii) P-type semiconductor
 - iv) Temp dependent fermi energy level

Q4) Answer the following :

- a) What are the types of SPLDs? Explain with block diagram. [7]
- b) Show that total current density of electrons & holes in semiconductor material is given by $I_{\text{drift}} = e (\mu_n n + \mu_p p) E$ [5]

Q5) Answer the following :

- a) Explain the semiconductor material on the basis of their types, Material types & applications. [7]
- b) Explain in brief [5]
 - i) Zener breakdown
 - ii) Avalanche breakdown

Q6) Answer the following :

- a) Explain the principle of operation of PIN diode with application. [7]
- b) With help of neat labelled diagram, Explain structure of BJT. Draw the IV characteristics of BJT. [5]

Q7) Write a short note on following (any two) : [12]

- a) Moore & Mealy circuit model with neat labelled block diagram.
- b) IV characteristics of JFET with proper explanation of various regions.
- c) Explain the terms
 - i) Conductivity
 - ii) Mobility
 - iii) Resistivity
 - iv) Carrier concentration



Total No. of Questions : 5]

SEAT No. :

PE-4737

[Total No. of Pages : 2

[6518]-33

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS - 603 MJ : Advanced Industrial Electronics

(2020 Pattern) (Semester - III) (Theory)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5
- 3) Q.2 to Q.5 carry equal marks.

Q1) Attempt any FIVE of the following:

[5]

- a) What is Full form of "GTO"?
- b) Draw the circuit symbol of SCR and IGBT.
- c) Define Actuators.
- d) List any two applications of AC - AC Converter.
- e) Draw two transistor model of SCR.
- f) List any Four applications of VFD's

Q2) Attempt the following:

- a) i) Explain Forward voltage triggering method of SCR. [2]
- ii) Explain construction and working of Thyristor. [4]
- b) Draw and explain the circuit diagram of Resistance Firing circuit of SCR. [4]

Q3) Attempt the following:

- a) i) Explain applications of DC-DC converter. [2]
- ii) Draw and Explain working of step up chopper circuit. [4]
- b) Draw and Explain single phase Half wave controlled Rectifier circuit.[4]

P.T.O.

Q4) Attempt the following:

- a) i) Explain types of chopper circuits. [2]
- ii) Draw and Explain class A commutation method of thyristor. [4]
- b) Explain general block diagram of Thyristor gate trigger circuit. [4]

Q5) Attempt any four of the following: [10]

- a) Explain the construction and working of Relay.
- b) Write a short note on DC drives.
- c) Write a note on AC - AC converter circuit.
- d) Draw SCR triggering circuit using UJT.
- e) Write a short note on class B commutation of SCR.
- f) Explain the applications of valves.



Total No. of Questions : 5]

SEAT No. :

PE-4738

[Total No. of Pages : 2

[6518]-34

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS-610-MJ : Fundamentals of Electric Vehicle Technology (FEVT)

(2023 Pattern) (Credit 2) (Semester - III) (Major Elective Theory)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Color pencils/pens other than red color are allowed to use.*
- 5) *Neat diagrams must be drawn wherever necessary.*

Q1) Solve Any Five of the following :

[5]

- a) What is mean by Hybrid Electric Vehicle?
- b) Define chopper circuit?
- c) Give two types of Energy Consumption.
- d) What is soft switching in inverters?
- e) What is the purpose of using an Electric Vehicle (EV)?
- f) What is the role of ultra-capacitors?

Q2) Answer the following :

- a) i) Give any two reasons behind use of HEV. **[2]**
- ii) Explain single motor drive system in an Electric Vehicle (EV). **[4]**
- b) Explain four quadrants of DC chopper operation. **[4]**

P.T.O.

Q3) Answer the following :

- a) i) What is inductive charging? [2]
- ii) Explain basic charger circuit. [4]
- b) Explain the working principle of BLDC motor in an EV. [4]

Q4) Answer the following :

- a) i) Mention two types of battery chargers. [2]
- ii) Name any four types of batteries. [4]
- b) Write a note on future scope of HEVs. [4]

Q5) Write a short note on any four of the following : [10]

- a) Losses in wired charging technology.
- b) Advantages of HEVs
- c) Occasional charging station
- d) Challenges of EVs
- e) Arrangement of an off-board conductive charger
- f) Move and charge zone.



Total No. of Questions : 5]

SEAT No. :

PE-4739

[Total No. of Pages : 2

[6518]-35
M.Sc. (Part - II)
ELECTRONIC SCIENCE
ELS-611-MJ : Fundamentals and Applications of Raspberry
PI using Python
(NEP 2020) (2023 Pattern) (Credit 2) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve Any Five of the following :

[5]

- a) What is the language used by Raspberry pi?
- b) Define embedded system.
- c) What is Soc?
- d) What is the role of DSP in Raspberry pi?
- e) State any two names of an operating system use in RPi.
- f) What is interpreter?

Q2) a) i) What is the speed of operation in Pi3?

[2]

ii) What is the NOOBS software?

[4]

b) Draw the block diagram of Soc and explain it.

[4]

P.T.O.

Q3) a) i) List different GPIO functions used in python. [2]

ii) What is Raspberry Pi and explain different features of it. [4]

b) Explain how LED blinking can be controlled using Raspberry Pi. [4]

Q4) a) i) Write a python code to add two numbers. [2]

ii) Explain the standard data types of python. [4]

b) Explain the single board computer structure using neat block diagram.[4]

Q5) Answer any four of the following : [4 × 2.5 = 10]

a) How is Raspberry Pi different from Arduino?

b) What is Pi camera module?

c) State the functions of an operating system.

d) GPIO pins used in RPi boards.

e) Graphics processing unit.

f) List different operators used in python.



Total No. of Questions : 5]

SEAT No. :

PE-5562

[Total No. of Pages : 2

[6518]-36
M.Sc. (Part - II)
ELECTRONIC SCIENCE
ELS-612-MJ : Digital Signal Processing : Processor and
Applications
(2023 Pattern) (Semester - III) (Credits - 2)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Solve any five of the following :

[5 × 1 = 5]

- a) Define digital filter.
- b) What is the function of ALU in DSP?
- c) Write any two applications of DSP.
- d) What is MAC operation of digital signal processor?
- e) Define transfer function.
- f) Write the full form of DIT and DIF.

Q2) Attempt the following :

- a) i) What is correlation? **[2]**
ii) What is fixed point processor? **[4]**
- b) Given $x(n) = \{0, 1, 2, 3, 4, 5, 6, 7\}$ find $x(k)$ using DIT FFT algorithm. **[4]**

Q3) Attempt the following :

- a) i) Discuss programming issues in DSP. **[2]**
ii) Explain how DSP processor is used in SONAR system. **[4]**
- b) Given two sequences of length $N = 4$ defined by $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{2, 1, 1, 2\}$, determine circular convolution. **[4]**

P.T.O.

Q4) Attempt the following :

- a) i) Explain IIR filter with proper example. [2]
- ii) Explain the role of DSP in RADAR system. [4]
- b) Find linear convolution of $x(n) = \{1, 2, 3\}$ and $h(n) = \{4, 3\}$ using equation. [4]

Q5) Attempt any Four of the following : [10]

- a) Write short note on floating point processor.
- b) Describe the architecture of TMS 320x series DSP.
- c) Write short note on fourier transform.
- d) What is importance of pole zero plot.
- e) Describe the program control in DSP.
- f) Explain in brief why DSP processor is required in voice processing.



Total No. of Questions : 5]

SEAT No. :

PE-4741

[Total No. of Pages : 2

[6518]-37
M.Sc. (Part - II)
ELECTRONIC SCIENCE
ELS-613-MJ : Nano Technology
(2023 Pattern) (Credit 2) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Attempt any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Attempt Any Five of the following :

[5]

- a) What is mobility?
- b) Define resistivity.
- c) What is the meaning of phonon?
- d) Judge the effect of decrease in blue shift on band gap in UV Spectroscopy.
- e) Give the relation between absorbance and transmittance.
- f) What is blank in spectrophotometer?

Q2) Attempt the following :

- a) Explain in detail physical vapour deposition. **[5]**
- b) Write a short note on applications of nanomaterials in case of automobile sector. **[5]**

P.T.O.

Q3) Attempt the following :

- a) Explain with the help of schematic diagram IR spectrometer. [5]
- b) What is illuminance? Explain photo illuminance spectrometer. [5]

Q4) Attempt the following :

- a) Explain the use of nanomaterials in space, defense & engineering. [5]
- b) What is band gap? Explain electronic structure of nanomaterial. [5]

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

- a) Use of nanomaterials in cosmetics
- b) Raman spectrometer setup.
- c) Electric arc deposition
- d) Semiconductor nanoparticle.
- e) Working of sonochemical synthesis method.
- f) Working principle of LED.



Total No. of Questions : 7]

SEAT No. :

PE-4742

[Total No. of Pages : 2

[6518]-41

M.Sc. - II

ELECTRONIC SCIENCE

**ELS 651 MJ : Advanced Embedded System Design
(2023 Pattern) (Semester - IV) (Credit - 4)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Q.2 to Q.7 carry equal marks.
- 4) Neat diagram must be drawn whenever necessary.

Q1) Answer any five of the following :

[10]

- a) Define operating system?
- b) Define the term microprocessing?
- c) What is system call give one example of it?
- d) Define cache memory?
- e) What is thread in OS?
- f) Name two application of cortex M3 processor?

Q2) Answer the following :

- a) i) What is the built in Nested Vector Interrupt Controller (NVIC)?[2]
ii) Draw a detail block diagram of arm cortex m3 processor and explain each block? [5]
- b) Explain the design and implementation of process in an operating system? [5]

Q3) Answer the following :

- a) i) Define task Synchronization in RTOS? [2]
ii) Describe the Differentiation between multiprocessing and multitasking? [5]
- b) Explain the concept of Interrupt behaviour in arm cortex m3? How does processor handle Interrupt? [5]

P.T.O.

Q4) Answer the following :

- a) i) What are the general types of registers present in ARM cortex m3 processor? [2]
- ii) Explain the importance of NVIC, memory protection unit & interrupt handling in arm cortex m3 processor? [5]
- b) Describe the BIOS action during the boot process in detail? [5]

Q5) Answer the following :

- a) i) What is the role of GPIO pin in the LPC176X microcontroller and their applications? [2]
- ii) Explain the different type operating system with example, focusing on real time operating system? [5]
- b) Describe the different type of system calls and their significans in the operating system? [5]

Q6) Answer the following :

- a) i) Give the difference between Virtual memory and Physical memory? [2]
- ii) Explain various type of Input Output devices in LPC176X such as CAN,SPI and I2C? [5]
- b) Explain pipeline stages, bus Interface and memory system arm cortex m3 processor? [5]

Q7) Answer any two of the following :

- a) Explain the difference between segmentation and paging in memory management? [6]
- b) Describe the exception programming in the arm cortex m3 processor? Provide the example of exception handling? [6]
- c) Give a detail difference between RTOS and general purpose operating system? [6]



Total No. of Questions : 7]

SEAT No. :

PE-4743

[Total No. of Pages : 2

[6518]-42

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS-652 MJ 4 : Robotics And Mechatronics (RAM)
(2023 Pattern) (NEP) (Semester - IV) (Credit - 4)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Questions 1 is compulsory.
- 2) Answer any 5 questions from Q2 to Q7.
- 3) Figures to the right indicate full marks.
- 4) Color pencils/pens other than red are allowed to be used for diagrams.
- 5) Draw neat diagram whenever necessary.
- 6) Use of calculator is allowed.

Q1) Solve any five of the following :

[5 × 2 = 10]

- a) Define : Robotics.
- b) What is mean by mechatronic systems?
- c) Give any four industrial applications of Robot.
- d) Feedback control systems are needed in Robotics, justify.
- e) What is gear?
- f) What is line motion and circular motion?

Q2) Attempt the following :

- a) i) Explain the manipulator [3]
- ii) Explain operation and need of Relay. [4]
- b) Write a note on : [5]
 - i) Gear trains and
 - ii) Gear ratios

P.T.O.

Q3) Attempt the following :

- a) i) Explain applications of Robots in medical sector with examples. [3]
- ii) Write a note on micro robots. [4]
- b) Write a note on Basic components of robot systems. [5]

Q4) Attempt the following :

- a) i) What is Sensors and Transducers? [3]
- ii) Explain Bearings and its applications. [4]
- b) Explain the role of Accuracy and Repeatability of Robotics Design. [5]

Q5) Attempt the following :

- a) i) Explain Thyristor as switch. [3]
- ii) Explain role of Slider - Crank in brief. [4]
- b) Explain ball screws and links. [5]

Q6) Attempt the following :

- a) i) Explain Cams and Gears. [3]
- ii) Explain with diagram belt and chain drives. [4]
- b) Write a note on M.I and Torque for motor selection. [5]

Q7) Write a short note on any two of following : [2 × 6 = 12]

- a) Future of Robotics
- b) Robotics with Artificial Intelligence (A.I.)
- c) Kinematic Chains.



Total No. of Questions : 5]

SEAT No. :

PE-4744

[Total No. of Pages : 2

[6518]-43

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS - 660 MJ : Advanced Electric Vehicle Technology (AEVT)
(2023 Pattern) (Credit - 2) (Semester - IV) (Theory)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any 3 questions from Q.2 to Q.5*
- 3) *Figures to the right indicate full marks.*
- 4) *Color pencils/pens other than red are allowed to be used for diagrams.*
- 5) *Draw neat diagram whenever necessary.*
- 6) *Use of Calculator is allowed.*

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

- a) Define HEV.
- b) What is role of Ultra-capacitors?
- c) What is Inductive Charging?
- d) Why move and charge zone are important?
- e) What is mean by Power flow control?
- f) What is Electric Vehicle (EV)?

Q2) Answer the following:

- a) i) Give any two reasons behind use of EV. [2]
- ii) Explain Inductive Charging. [4]
- b) Write a note on Battery Swapping Station. [4]

Q3) Answer the following:

- a) i) Mention two types of Battery Chargers. [2]
- ii) Explain how fast charging station works. [4]
- b) Write a note on Public Charging Infrastructure. [4]

P.T.O.

Q4) Answer the following:

- a) i) What is Normal Charging Station? [2]
- ii) What are the different configurations of HEV? [4]
- b) Explain Arrangement of an off-board conductive charger. [4]

Q5) Write short notes (any Four):

[4 × 2.5 = 10]

- a) Challenges of EVS.
- b) Role of Artificial Intelligence (A.I) in EVs.
- c) Wireless Charging Technology.
- d) Applications of Power Electronic Converters.
- e) Microprocessor based charger circuit.
- f) Hard Switching and Soft Switching converters.



Total No. of Questions : 5]

SEAT No. :

PE-4745

[Total No. of Pages : 2

[6518]-44

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS - 661 MJ : Internet of Things

(2023 Pattern) (Semester - IV)(Credit - 2)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any 3 questions from Q.2 to Q.5
- 3) Question 2 to 5 carry equal marks.
- 4) Neat diagram must be drawn whenever necessary.

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

- a) Define the term "Internet of things".
- b) What are the different types of RFID Tags.
- c) Name one example of an enabling technology in IoT for identification.
- d) Give the types of identifiers in IoT.
- e) What does "e - Health" in IoT refer to?
- f) What is mean by security Vulnerabilities?

Q2) Answer the following:

- a) i) Explain the threat modelling in IoT security & its importance. [2]
ii) Discuss how "Device Power Manage" in IoT system. [4]
- b) Explain the concept of "Tracking in IoT & give two examples of its applications. [4]

Q3) Answer the following:

- a) i) What is basic nodal capability in the IoT Framework. [2]
ii) Discuss the general Frameworks of IoT as per ITU-T view. [4]
- b) Discuss how "Scalability and Interoperatability" effect design and performance of IoT system. [4]

P.T.O.

Q4) Answer the following:

- a) i) What is significance of satellite technology in IoT system. [2]
ii) Explain the working definition of IoT & its frameworks and provide examples of Real-World IoT application. [4]
- b) Discuss the application of IoT in "Home Automation" and how IoT enhances home automatic application and its safety. [4]

Q5) Attempt any FOUR of the following: [4 × 2.5 = 10]

- a) Describe the concept of "City Automation" in the context of IoT application.
- b) Describe the key components of RFID.
- c) What are the vulnerabilities in IoT system.
- d) What is the main purpose of "Smart metering" in IoT system.
- e) What are the key difference between IoT & traditional network system.
- f) Explain any three challenges for secure IoT.



Total No. of Questions : 5]

SEAT No. :

PE-4746

[Total No. of Pages : 2

[6518]-45

M.Sc. (Part - II)

ELECTRONIC SCIENCE

ELS - 662 MJ : Digital Image Processing
(2023 Pattern) (Semester - IV)(Credit - 2)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any 3 questions from Q.2 to Q.5
- 3) Question 2 to 5 carry equal marks.
- 4) Draw neat diagram wherever necessary.
- 5) Use of calculator is allowed.

Q1) Answer any five of the following:

[5]

- a) Define digital image.
- b) What is gray level in DIP?
- c) State the purpose of thresholding in segmentation.
- d) Give the acronym of TIFF.
- e) What do you mean by path?
- f) What is spatial resolution?

Q2) Answer the following:

- a) i) How an image is identified as Oversegmented? [2]
ii) Discuss the RGB model for color image. [4]
- b) Explain spatial filter operation for smoothing an image with the help of example. [4]

Q3) Answer the following:

- a) i) Define subjective brightness and brightness adaption. [2]
ii) Illustrate the major steps in Digital Image Processing. [4]
- b) What is image acquisition? Explain any one type of image acquisition device. [4]

P.T.O.

Q4) Answer the following:

- a) i) Define 4 and 8 neighbours of a pixel. [2]
- ii) Explain Mach band effect. [4]
- b) Explain the term quantization in detail. [4]

Q5) Answer any four of the following: [10]

- a) Mention the properties of Haar transform.
- b) Write the application of image processing in medical field.
- c) Explain edge detection as a tool for detecting discontinuities in digital image.
- d) What is image restoration? Give the reason why restoration is called unconstrained & constrained restoration.
- e) Explain image translation and scaling.
- f) Explain the color image fundamentals.



Total No. of Questions : 5]

SEAT No. :

PE-4747

[Total No. of Pages : 2

[6518]-46

M.Sc. (Part - II)

ELECTRONIC SCIENCE

**ELS - 663 MJ : Integrated Circuit (IC) Technology and VLSI
(2023 Credit Pattern) (Semester - IV)(Credit 2)(Major Elective)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any 3 questions from Q.2 to Q.5*
- 3) *Question 2 to 5 carry equal marks.*
- 4) *Neat diagram must be drawn whenever necessary.*

Q1) Answer any five of the following: [5]

- a) State key features of BiCMOS technology.
- b) What is the purpose of etching in VLSI fabrication?
- c) State the basic principle of the SILAR.
- d) Why packaging is necessary for integrated circuits?
- e) Draw stick diagram of CMOS inverter.
- f) What is metallization?

Q2) Answer the following:

- a) i) Explain working principle and advantages of a CMOS transmission gate. [3]
- ii) Draw stick diagram of 2-input NOR gate. [3]
- b) Explain characteristics of CMOS design style. [4]

Q3) Answer the following:

- a) i) Explain spin coating technique for thin film deposition. [3]
- ii) Explain the significance of the diffusion process in semiconductor device fabrication. [3]
- b) What are the basic steps involved in photo-lithography? Explain each step in brief. [4]

P.T.O.

Q4) Answer the following:

- a) List different thin film deposition methods. Explain Chemical Bath Deposition (CBD) in detail. Give it's applications. **[6]**
- b) Give the difference between nMOS and CMOS fabrication process.**[4]**

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

- a) Pass Transistors.
- b) Contact cuts in Layout Design
- c) Hall effect measurement
- d) Ion - beam Lithography
- e) Water Fabrication
- f) Electric VLSI Design System.

