

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)

MG5DSCECT300/MG5DSCECC300 – Digital Design using Verilog

Duration: 1.5 hours

Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E)*

Part A

Multiple Choice Questions

Answer **All** Questions, each question carries **1** mark

- | | |
|---|----------|
| 1. Which of the following represents a basic design unit in Verilog?
a) Loop
b) Module
c) Function call
d) Variable | R 1 |
| 2. Which Verilog data type is commonly used to represent a variable that can store procedural assignments?
a) wire
b) reg
c) module
d) assign | R 1 |
| 3. Which Verilog construct is primarily used for describing behavior that is evaluated procedurally?
a) always
b) wire
c) module
d) assign | U 1 |
| 4. What is the result of the Verilog expression 4'b1010 & 4'b1100?
a) 4'b1110
b) 4'b1000
c) 4'b0110
d) 4'b0010 | A 1 |
| 5. Which Verilog expression correctly implements the Sum of a Full Adder?
a) assign Sum = A & B & Cin;
b) assign Sum = A B Cin;
c) assign Sum = A ^ B ^ Cin; | A 2 |

- d) assign Sum = ~(A ^ B ^ Cin);
6. A 3-to-8 decoder has three input lines. If the inputs are 101, which output line is activated in an active-HIGH decoder? A 2
- a) Y1
b) Y3
c) Y5
d) Y7
7. A Verilog gate is specified as: *and # (3, 7) (Y, A, B);*
Assuming the two delay values represent rise and fall delays respectively, what happens when the output changes from 0 to 1 and from 1 to 0? An 2
- a) Rise = 3 ns, Fall = 7 ns
b) Rise = 7 ns, Fall = 3 ns
c) Rise = Fall = 3 ns
d) Rise = Fall = 7 ns
8. Which Verilog block executes once at the beginning of simulation? R 3
- a) Always
b) Assign
c) Initial
d) Forever
9. What is the purpose of the sensitivity list in an always block? U 3
- a) It specifies the output variables
b) It specifies when the block should execute
c) It determines the clock frequency
d) It specifies simulation time
10. Which assignment is generally preferred for a flip-flop in a clocked *always* block? U 3
- a) Blocking assignment =
b) Non-blocking assignment <=
c) Continuous assignment assign
d) Conditional assignment ?

1*10 = 10

Part B

Short Answer Questions

Answer 4 Questions, each question carries 5 marks

11. List the major levels of design description used in Verilog. U 1
12. What is concurrency in Verilog? Explain with an example. An 1
13. Define rise time delay, fall time delay, and turn-off delay in a digital circuit. U 2
14. Write Verilog code for a JK Flip-flop using dataflow modelling A 3
15. What is a continuous assignment in Verilog? Explain the use of the *assign* statement with a suitable example. R 3
16. Develop a basic Verilog testbench for a 2-to-1 multiplexer and explain how

delay control can be used to apply different input combinations. How would you verify that the output is correct? A 3

4 * 5 = 20

Part C

Essay Questions

Answer **2** Questions, each question carries **10** marks

17. Explain the basic structure of a Verilog program. Describe the purpose of modules, ports, declarations, and statements. U 1

18. Explain the design of a Full Adder and a Full Subtractor using gate-level modelling in Verilog. Describe the inputs and outputs of each circuit. A 2

19. Explain continuous assignment in Verilog. Describe the use of the assign statement with a simple example. A 3

20. Compare data flow modeling and behavioral modeling in Verilog. Give suitable examples of circuits designed using both methods. An 3

2 * 10 = 20

Reg.No :

Name :

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS) EXAMINATION

V SEMESTER

**MG5DSCECT301 - Artificial Intelligence and Machine Learning
(2024 ADMISSION ONWARDS)**

Duration: 1 Hour 30 Minutes

Maximum Marks: 50

Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate(E), Create(C), Skill(S),
Interest(I) and Appreciation(Ap)

*Students should attempt at least one question from each course outcome to enhance their
overall outcome attainability*

Part A

Multiple Choice Questions

Answer all questions

Each question carries 1 mark

1. Which of the following best describes a rational agent in Artificial Intelligence? [U]/[CO1]
 - a) An agent that always performs random actions
 - b) An agent that selects actions expected to maximize its performance measure
 - c) An agent that only follows predefined instructions
 - d) An agent that does not interact with its environment

2. Which of the following is an important step in AI problem formulation? [U]/[CO1]
 - a) Data encryption
 - b) Goal formulation
 - c) Image compression
 - d) Database normalization

3. Which search algorithm uses an evaluation function based on the actual cost and estimated cost to the goal? [U]/[CO1]
 - a) Breadth First Search
 - b) Depth First Search
 - c) A* Search
 - d) Random Search

4. Which local search technique is inspired by the process of cooling metals? [U]/[CO1]

- a) Hill Climbing
- b) Simulated Annealing
- c) Local Beam Search
- d) Genetic Algorithm

5. In a Genetic Algorithm, the process of combining parts of two parent solutions is called:

[A]/[CO2]

- a) Mutation
- b) Selection
- c) Crossover
- d) Evaluation

6. Which of the following is a limitation commonly associated with Hill Climbing?

[A]/ [CO2]

- a) It always finds the global optimum
- b) It may get trapped in a local optimum
- c) It requires Bayesian inference
- d) It uses a game tree

7. In the Mini-Max algorithm, the MAX player attempts to:

[U]/[CO1]

- a) Minimize the utility value
- b) Maximize the utility value
- c) Remove all game states
- d) Randomly select a move

8. Which theorem is used to calculate the probability of an event based on prior knowledge and evidence?

[U]/[CO1]

- a) Bayes' Theorem
- b) Pythagoras' Theorem
- c) Green's Theorem
- d) Rolle's Theorem

9. Which of the following is used to summarize the performance of a classification model using TP, TN, FP and FN?

[A]/[CO2]

- a) Confusion Matrix
- b) Cost Function
- c) Decision Tree
- d) Bayesian Network

10. Which regularization technique adds the absolute values of model parameters to the cost function?

[A]/[CO4]

- a) L1 Regularization
- b) L2 Regularization
- c) Early Stopping
- d) Cross Validation

[1x10 = 10]

Part B

Short Answer Questions

Answer any 4 questions

Each question carries 5 marks

11. Explain the concept of rationality in Artificial Intelligence. Describe the characteristics of a rational agent with a suitable example. [U]/[CO1]
 12. Explain the A Search algorithm*. Describe the role of the functions $g(n)$, $h(n)$ and $f(n)$ in A* search. [U]/[CO1]
 13. Explain the Mini-Max algorithm used in adversarial search. Illustrate its working with a simple game-tree example. [A]/[CO2]
 14. Explain Propositional Logic, including its syntax and semantics. [A]/[CO2]
 15. State and explain Bayes' Theorem. Explain how it is used in probabilistic reasoning with a suitable example. [A]/[CO2]
 16. Explain the different types of attributes in data and distinguish between discrete and continuous attributes. Discuss any important data quality problems. [A]/[CO3]
- [5x4 = 20]**

Part C Essay Questions

*Answer any 2 questions
Each question carries 10 marks*

- 17.a) Explain the different local search techniques used in Artificial Intelligence.
b) Describe the working of Hill Climbing, Simulated Annealing and Local Beam Search. [U]/[CO1]
18. a) Explain Bayesian Networks, including their syntax and factorization.
b) Explain inference in Bayesian Networks and the concept of conditional independence. [A]/[CO2]
- 19.a) Explain the Linear Regression model and its model learning process.
b) Discuss L1 and L2 regularization and early stopping as techniques for controlling overfitting. [A]/[CO3]
- 20.a) Explain the construction and working of a Decision Tree. Discuss Gini Impurity, Entropy and Information Gain.
b) Explain the K-Nearest Neighbour (KNN) algorithm and discuss the selection of the value of K using the Elbow Method. [A]/[CO3,CO4]

[10x2 = 20]

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)

MG5DSCECT302

Embedded Systems with AVR Microcontroller

Duration: 1.5 hours

Maximum Marks: 50

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer All Questions, Each question carries 1 mark

- | | | | |
|---|---|---|---|
| 1 | Which component integrates CPU, memory and I/O peripherals on a single chip?
A) Microprocessor
B) Microcontroller
C) RAM
D) ALU | R | 1 |
| 2 | AVR microcontrollers are based on which architecture?
A) CISC
B) RISC
C) VLIW
D) SIMD | R | 1 |
| 3 | The AVR microcontroller primarily uses which memory architecture?
A) Von Neumann
B) Harvard
C) Distributed
D) Virtual | R | 1 |
| 4 | Which instruction is used to rotate a register right through the Carry flag?
A) ROL
B) ROR
C) LSL
D) ASR | U | 2 |
| 5 | What is the primary purpose of the stack?
A) Store program instructions
B) Store temporary data, return addresses and register contents
C) Store ADC results permanently
D) Store I/O port addresses | R | 2 |
| 6 | Which AVR register determines whether a port pin is configured as input or output?
A) PORT
B) PIN
C) DDR
D) SREG | U | 2 |
| 7 | What is an Interrupt Vector Table?
A) A table containing I/O values
B) A table containing addresses of interrupt service routines
C) A table containing timer values
D) A table containing register names | U | 2 |
| 8 | Which device is used to provide electrical isolation between control and power circuits?
A) LCD
B) Opto-isolator
C) ADC
D) RTC | R | 3 |
| 9 | DS1307 is commonly used as a:
A) Temperature sensor
B) Real-Time Clock
C) Motor driver
D) Display controller | U | 3 |

- | | | | |
|----|--|---|---|
| 10 | Which peripheral is commonly used to display text and numbers? | U | 3 |
| | A) LCD B) ADC C) Relay D) RTC | | |

10 * 1 = 10

Part B

Short Answer Questions

Answer 4 Questions, each question carries 5 marks

- | | | | |
|----|--|---|---|
| 11 | Differentiate between a microprocessor and a microcontroller. | U | 1 |
| 12 | What is RISC architecture? Mention advantages of RISC | U | 1 |
| 13 | Explain the functions of DDR, PORT and PIN registers in AVR. | U | 2 |
| 14 | What is an interrupt? What is the function of an Interrupt Vector Table? | R | 2 |
| 15 | What is USART? What are its applications in embedded systems? | U | 2 |
| 16 | What is I ² C communication? Mention two devices that can be interfaced using I ² C. | A | 3 |

4 * 5 = 20

Part C

Essay Questions

Answer 2 Questions, Each question carries 10 marks

- | | | | |
|----|--|---|---|
| 17 | Explain branch, loop and CALL instructions in AVR | U | 1 |
| 18 | Explain AVR I/O port programming in detail. | A | 2 |
| 19 | Explain the timer system of ATmega32 | A | 2 |
| 20 | Explain Relay and opto isolator, Stepper motor Interfacing | A | 3 |

2 * 10 = 20

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)

MG5DSEECT300 CLOUD COMPUTING

Duration: 2 hours

Maximum Marks: 70

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|----|--|---|---|
| 1 | Which technology forms the foundation of cloud computing?
A) Artificial Intelligence B) Virtualization C) Blockchain D) Robotics | U | 1 |
| 2 | Which cloud service model provides users with virtual machines, storage, and networking resources?
A) SaaS B) PaaS C) IaaS D) DBaaS | U | 1 |
| 3 | Which essential characteristic of cloud computing allows users to increase or decrease resources automatically?
A) Broad Network Access B) Measured Service
C) Resource Pooling D) Rapid Elasticity | U | 1 |
| 4 | Which deployment model is owned and managed by a single organization for its exclusive use?
A) Public Cloud B) Hybrid Cloud C) Community Cloud D) Private Cloud | U | 1 |
| 5 | Which cloud platform provides the Amazon EC2 service?
A) GCP B) Microsoft Azure C) AWS D) IBM Cloud | K | 2 |
| 6 | Which statement best describes a Public Cloud?
A) It is owned and managed by a single organization only.
B) It provides cloud services over the Internet for multiple users.
C) It is available only within a private network.
D) It cannot be accessed remotely. | U | 2 |
| 7 | Which AWS service helps monitor the performance of cloud resources?
A) Amazon S3 B) Amazon RDS
C) Amazon CloudWatch D) Amazon Route 53 | U | 2 |
| 8 | A company wants to migrate its existing application to the cloud while ensuring security and compliance. Which cloud provider feature would be most useful?
A) Monitoring and Governance Services B) Word Processing Software
C) Spreadsheet Application D) Local File Storage | A | 2 |
| 9 | Which of the following best describes the primary purpose of cloud security?
A) To increase the speed of cloud services only
B) To protect cloud infrastructure, applications, and data from threats
C) To reduce the number of cloud users
D) To eliminate the need for backups | U | 3 |
| 10 | Which of the following is an example of a cloud attack vector? | U | 3 |

- A) Data breach caused by weak passwords B) Installing a printer
C) Updating a keyboard driver D) Formatting a hard disk
- 11 A company stores confidential customer information in the cloud. Which security measure should be given the highest priority? A 3
A) Encrypting the stored data B) Increasing monitor brightness
C) Installing additional office computers D) Using a larger hard disk
- 12 A hospital is migrating patient records to the cloud. Which cloud security feature is most important? An 3
A) Data confidentiality and access control B) Faster Internet browsing
C) Colorful user interface D) High-resolution displays
- 13 Which cloud networking technology is commonly used to securely connect an organization's network to a cloud environment over the Internet? U 4
A) Cloud VPN B) Cloud CDN
C) Cloud API Gateway D) Object Storage
- 14 Which type of cloud storage stores data as files organized in folders? K 4
A) Block Storage B) Object Storage
C) File Storage D) Archive Storage
- 15 Why is network monitoring important in cloud networking? U 4
A) To increase monitor screen resolution
B) To detect performance issues and ensure network availability
C) To reduce the size of cloud storage
D) To replace cloud databases
- 16 Which of the following is an example of a cloud computing certification? K 4
A) AWS Certified Solutions Architect B) Microsoft Word Expert
C) Adobe Photoshop Associate D) Cisco IT Essentials

1 * 16 = 16

Part B

Short Answer Questions

Answer any **6** Questions

Each question carries 5 marks

- 17 Explain the role of virtualization in cloud computing U 1
- 18 Differentiate between IaaS, PaaS, and SaaS with suitable examples. U 1
- 19 List the major services provided by Amazon Web Services (AWS) and mention their purposes. U 2
- 20 Explain the business benefits of using a Public Cloud compared to maintaining a private data center. A 2
- 21 Discuss common breach scenarios and attack vectors. U 3
- 22 A financial organization plans to migrate its services to the cloud. Analyze the security requirements and recommend suitable cloud security services to protect sensitive financial data. An 3
- 23 List and briefly explain any two types of cloud storage K 4
- 24 Explain the importance of cloud network monitoring and troubleshooting in maintaining cloud services U 4

6 * 5 = 30

Part C

Essay Questions

Answer any **2** Questions

Each question carries 12marks

- | | | | |
|----|---|---|---|
| 25 | Discuss the fundamental elements and essential characteristics of cloud computing | U | 1 |
| 26 | Compare Amazon Web Services (AWS), Google Cloud Platform (GCP) based on: Application and data compatibility and Major services | A | 2 |
| 27 | Explain the different levels of cloud security. Discuss: Infrastructure-level c
Application-level and Data-level cloud security | U | 3 |
| 28 | Discuss -Internal and external cloud network requirements, Types of cloud
networking solutions and Cloud network monitoring and management | U | 4 |

2 * 12 = 24

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

**MGU-UGP (HONOURS)
V SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)**

B.Sc (HONOURS) ELECTRONICS WITH COMPUTER TECHNOLOGY

MG5DSEECT301

COMPUTER FORENSIC

Duration: 2 hours

Maximum Marks: 70

***Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C),
Skill (S), Interest (I) and Appreciation (Ap)**

Part A

Multiple Choice Questions

Answer All Questions, each question carries 1 mark

1. Computer forensics is primarily concerned with:
a) Designing computer hardware
b) Identifying, collecting and analyzing digital evidence
c) Developing application software
d) Repairing computer systems U 1
2. The primary purpose of forensic data acquisition is to:
a) Modify the original evidence
b) Obtain a reliable copy of digital evidence
c) Increase the storage capacity
d) Remove malicious files U 2
A forensic examiner needs to recover evidence stored inside a compressed file.
3. Which action should be performed?
a) Ignore the compressed file
b) Extract the contents using an appropriate forensic tool
c) Delete the archive
d) Rename all extracted files A 3
4. A forensic image that captures the complete contents of a storage medium is most closely associated with:
a) Physical acquisition b) Logical deletion
c) Network analysis d) Application installation An 4
5. Digital forensics is the process of:
a) Designing digital circuits
b) Identifying, collecting and analyzing digital evidence
c) Manufacturing mobile phones
d) Developing databases U 1
6. A file system is mainly responsible for:
a) Managing and organizing files on a storage device
b) Increasing the size of RAM
c) Connecting a computer to the Internet
d) Processing instructions in the CPU U 2
7. Identify which forensic activity helps map the location of deleted files on a storage device?

- a) File system examination b) Changing the wallpaper
c) Updating the operating system d) Installing games A 3
8. State which of the following is most suitable for categorizing storage formats used in digital forensics?
a) Logical and physical formats
b) Input and output formats
c) Hardware and software formats
d) Analog and digital keyboards An 4
9. A computer crime can be best defined as:
a) Any use of a computer for educational purposes
b) An unlawful activity involving a computer, network or digital system
c) The installation of legitimate software
d) The repair of a computer system U 1
10. A forensic image is best described as:
a) A screenshot of a computer system
b) A copy of digital storage data for investigation
c) A photograph of the computer
d) A graphical representation of a network U 2
11. Show which method is used to examine a compressed archive for deleted or hidden evidence?
a) Extract and analyze its contents
b) Change the computer clock
c) Restart the system repeatedly
d) Rename the archive without examining it. A 3
12. Predict, when two forensic tools are compared based on their support for FAT32 and NTFS, the investigator is:
a) Contrasting file system support
b) Changing the operating system
c) Formatting the disk
d) Encrypting evidence An 4
13. Phreaking can be distinguished from hacking because phreaking traditionally focuses on:
a) Telecommunication systems b) Office furniture
c) Printed books d) Computer processors only U 1
14. State, which file system is more suitable for managing larger files and advanced security features?
a) FAT32 b) NTFS
b) c) Simple text file system d) BIOS U 2
15. Interpret an investigator loads a disk image into Autopsy and examines deleted files. This activity illustrates:
a) Application of an open-source forensic tool
b) Hardware maintenance
c) Database design
d) Software piracy A 3
16. A tool supports NTFS but does not support FAT32. This difference can be used to:
a) Differentiate the tool's file system analysis capability
b) Increase disk capacity
c) Modify the original evidence
d) Create a network connection An 4

Part B

Short Answer Questions

Answer any 6 questions, each question carries 5marks

17. Describe the major stages involved in the computer forensic investigative process. U 1
18. Identify the major objectives of forensic data acquisition. U 2
19. Illustrate the process of recovering deleted files from a laptop using a forensic copy of its storage media. A 3
20. Differentiate between logical and physical storage formats used in digital forensic investigations. An 4
21. Define Digital Forensics and state its major categories. U 1
22. Classify FAT32, NTFS and UNIX file systems based on their associated operating systems. U 2
23. Select a suitable forensic tool for examining a disk image and justify its use based on the required task. A 3
24. Categorize forensic tools according to their operating system-related features and platform support. An 4

5*6=30

Part C

Essay Questions

Answer any 2 Questions, each questions carry 12 marks

25. Explain and discuss the complete computer forensic investigative process, including identification, preservation, collection, examination, analysis and presentation. U 1
26. Classify and explain the different types of data acquisition used in computer forensics. U 2
27. Illustrate the process of retrieving deleted data from a storage device and organize the major steps involved in the recovery process. A 3
28. Compare and contrast volatile and non-volatile digital evidence with respect to acquisition, preservation and forensic analysis. An 4

2*12=24

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
V SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)

MG5DSEECT302 Instrumentation

Duration: 2 hours

Maximum Marks: 70

Students should attempt at least one question from each course outcome to enhance their overall *outcome attainability*.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|---|---|----|---|
| 1 | Why are measurements significant in instrumentation?
A) They help in accurate monitoring and control
B) They increase instrument size
C) They eliminate standerds
D) They reduce the need of data | U | 1 |
| 2 | Which of the following is not a resistive transducer
A) Strain gauge
B) RTD
C) Thermistor
D) LVDT | A | 2 |
| 3 | Accuracy of measurement refers to
A) Closeness to the true value
B) Repeatability of measurement only
C) Speed of measurement
D) Size of instument | U | 1 |
| 4 | Instrumentation amplifiers are commonly used in
A) Power transmission
B) Measurement and sensor circuits
C) Lighting circuits
D) Digital counters only | C | 3 |
| 5 | The target in an X ray tube is usually made of
A) Copper
B) Tungsten
C) Aluminium
D) Silicon | An | 4 |
| 6 | The Rf coil in MRI system is used to
A) Transmit and/or receive radio frequency signal
B) Produce X rays
C) Generate ultra sound | An | 4 |

- D) Measure temperature only
- 7 The function of a signal conditioning element is to U 1
- A) Measure temperature only
- B) Modify the signal into suitable form
- C) Display the output
- D) Store the measurement
- 8 The principle of pulse oximeter is based on An 4
- A) Ultrasound
- B) Light absorption by blood
- C) Magnetic induction
- D) Electrical resistance
- 9 A thermistor is a resistive transducer whose resistance is highly sensitive to A 2
- A) Temperature
- B) Displacement
- C) Force
- D) Speed
- 10 ECG is used to record the electrical activity of An 4
- A) Brain
- B) Heart
- C) Muscle
- D) Lungs
- 11 The EEG signal is amplified using An 4
- A) Power amplifier
- B) Instrumentation amplifier
- C) Oscillator
- D) Rectifier
- 12 The working principle of thermocouple is based on A 2
- A) Hall effect
- B) Seebeck effect
- C) Photoelectric effect
- D) Piezoelectric effect
- 13 The D 8562 can operate from a supply voltage of approximately C 3
- A) 0-1V
- B) 2.7-5.5V
- C) 10-20V
- D) 20-30V
- 14 The two secondary windings of LVDT are connected A 2
- A) In parallel aiding
- B) In series opposition
- C) In series aiding
- D) Independently
- 15 Wheatstone bridge is mainly used to measure C 3
- A) Unknown resistance
- B) Unknown capacitance
- C) Frequency
- D) Temperature
- 16 Which of the following is not a static characteristic?

- A) Accuracy
- B) Precision
- C) Sensitivity
- D) Speed of response

U 1

$$1 * 16 = 16$$

Part B

Short Answer Questions

Answer any 6 Questions

Each question carries 5 marks

- | | | | |
|----|---|----|---|
| 17 | Differentiate between static and dynamic characteristic of an Instrument? | U | 1 |
| 18 | Explain the working of an ultrasonic imaging system? | An | 4 |
| 19 | Define Sample and hold circuit? Need of this circuit? | C | 3 |
| 20 | Describe how load cell is used for weight measurement ? | A | 2 |
| 21 | Explain the working of computed tomography? | An | 4 |
| 22 | What are the basic elements of a generalized measurement system? | U | 1 |
| 23 | Explain the working of R-2R ladder circuit? | A | 3 |
| 24 | Explain thermistor? | A | 2 |

$$6 * 5 = 30$$

Part C

Essay Questions

Answer any 2 Questions

Each question carries 12 marks

- | | | | |
|----|---|----|---|
| 25 | Draw and explain LVDT? | A | 2 |
| 26 | Explain Wheatstone bridge and maxwell bridge circuit? | C | 3 |
| 27 | Draw and explain the working of a generalised measurement system? | U | 1 |
| 28 | Draw and explain the working of pulse oximeter | An | 4 |

$$2 * 12 = 24$$

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

**MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISSION ONWARDS)**

MG5DSEECT303/ MG5DSEEC300 Microwave Electronics

Duration:2 Hrs.

Maximum Marks:70

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

*Remember (K), Understand (U), Apply (A), Analyze (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

Part A

Multiple Choice Questions

Answer all questions. Each question carries 1 mark

1. Which mode of electromagnetic wave propagation has both electric and magnetic fields transverse to the direction of propagation? U 1
A. TEM B. TE
C. TM D. EM
2. Which of the following is an important advantage of microwave communication? U 1
A) Large antenna size B) Low bandwidth
C) High bandwidth D) High power consumption
3. In TE mode, the electric field component along the direction of propagation is: U 1
A) Maximum B) Zero
C) Infinite D) Equal to magnetic field
4. The velocity with which a constant phase point travels is called: U 1
A) Group velocity B) Phase velocity
C) Signal velocity D) Drift velocity
5. Which of the following is a property of microwaves? U 1
A) Very long wavelength B) High directivity
C) Very low frequency D) Poor bandwidth
6. Which transmission line has a central conductor and a cylindrical outer conductor? U 2
A) Stripline B) Microstrip
C) Coaxial line D) Two-wire line
7. A perfectly matched transmission line has a VSWR of: U 2
A) 0 B) 1
C) 2 D) ∞

- | | | | |
|-----|---|---|---|
| 8. | Which transmission line has conductors embedded between two dielectric layers? | U | 2 |
| | A) Microstrip | | |
| | B) Stripline | | |
| | C) Coaxial line | | |
| | D) Two-wire line | | |
| 9. | The first cavity of a two-cavity klystron is called the: | A | 3 |
| | A) Catcher cavity | | |
| | B) Buncher cavity | | |
| | C) Resonator cavity | | |
| | D) Collector cavity | | |
| 10. | A varactor diode is normally operated under: | A | 3 |
| | A) Forward bias | | |
| | B) Reverse bias | | |
| | C) Zero bias only | | |
| | D) Breakdown only | | |
| 11. | The resonant cavities in a cavity magnetron are formed in the: | A | 3 |
| | A) Cathode | | |
| | B) Anode block | | |
| | C) Reflector | | |
| | D) Collector | | |
| 12. | The velocity modulation in a klystron occurs when electrons pass through the: | A | 3 |
| | A) Collector | | |
| | B) Buncher cavity | | |
| | C) Cathode | | |
| | D) Reflector | | |
| 13. | A T-junction is a: | C | 4 |
| | A) Two-port device | | |
| | B) Three-port device | | |
| | C) Four-port device | | |
| | D) Five-port device | | |
| 14. | A hybrid ring is also commonly called a: | C | 4 |
| | A) Magic circle | | |
| | B) Rat-race coupler | | |
| | C) Waveguide filter | | |
| | D) Cavity coupler | | |
| 15. | Which device is most suitable for protecting a microwave source from reflected power? | C | 4 |
| | A) Isolator | | |
| | B) T-junction | | |
| | C) Hybrid ring | | |
| | D) Taper | | |
| 16. | A cavity resonator stores electromagnetic energy primarily in: | C | 4 |
| | A) Mechanical form | | |
| | B) Electric and magnetic fields | | |
| | C) Thermal energy | | |
| | D) Chemical energy | | |

1 x 16 = 16

Part B

Short Answer Questions

Answer 6 Questions. Each question carries 5 marks

- | | | | |
|-----|---|---|---|
| 17. | Define microwaves and explain the microwave frequency range. Mention any four important applications of microwaves. | U | 1 |
| 18. | Explain the electromagnetic spectrum and discuss the applications of different regions of the spectrum. | U | 1 |
| 19. | Compare stripline and microstrip transmission lines. | U | 2 |
| 20. | Explain reflection coefficient, standing waves, and VSWR. | U | 2 |

- | | | | |
|-----|--|---|---|
| 21. | Explain the construction and operation of a two-cavity klystron. | A | 3 |
| 22. | Explain the working principle of a TWT and mention its applications. | A | 3 |
| 23. | What is a magic tee? Mention its applications. | C | 4 |
| 24. | Differentiate between an isolator and a circulator. | C | 4 |

6 x 5 = 30

Part C

Essay Questions

Answer any 2 Questions. Each question carries 12 marks

- | | | | |
|-----|--|---|---|
| 25. | Explain the importance and applications of microwave engineering. | U | 1 |
| 26. | Explain the basic concept of a waveguide and state its advantages over transmission lines. | U | 2 |
| 27. | Explain the working principle and applications of a magnetron. | A | 3 |
| 28. | Explain the working principle and applications of an isolator. | C | 4 |

2 x 12 = 24

- 8) Select the appropriate motion-control technique when a robot must follow a smooth predefined path during welding. [CO2][U]
 - a) Point-to-point motion
 - b) Continuous path motion
 - c) On-off control
 - d) Manual control
- 9) Use an appropriate system to provide operators with a graphical interface for monitoring and controlling an industrial process. Which system should be selected? [CO3][A]
 - a) HMI
 - b) Servo motor
 - c) CAN
 - d) Modbus
- 10) Select the most suitable communication protocol for connecting industrial devices using a widely used Ethernet-based industrial network. [CO3][U]
 - a) DeviceNet
 - b) Ethernet/IP
 - c) CAN
 - d) DC servo
- 11) Employ a servo motor in an application that requires accurate position and speed control. Which feature makes it suitable? [CO3][A]
 - a) Open-loop operation without feedback
 - b) Feedback-based precise control
 - c) Manual switching only
 - d) Fixed-speed operation only
- 12) Use the appropriate SCADA component for collecting data from field devices such as sensors and controllers. [CO3][A]
 - a) Data acquisition unit
 - b) Servo motor
 - c) HMI keyboard
 - d) Power supply
- 13) Differentiate between a proximity sensor and a photoelectric sensor based on their method of object detection. [CO4][An]
 - a) Proximity sensors always require physical contact
 - b) Photoelectric sensors use light for detection, while proximity sensors detect objects without direct contact
 - c) Both sensors operate only through temperature measurement
 - d) Both sensors require mechanical contact
- 14) A sensor having high accuracy but low precision. Which condition best describes its performance? [CO4][An]
 - a) Measurements are consistently close to each other but far from the true value
 - b) Measurements are close to the true value but widely scattered
 - c) Measurements have both high accuracy and high precision
 - d) Measurements have low sensitivity and high resolution
- 15) Examine an industrial automation system that uses wireless sensors to continuously collect machine data. Which technology is most appropriate for connecting these sensors? [CO4][An]
 - a) Wireless Sensor Network
 - b) Panel connector
 - c) Solid-state relay
 - d) Cable labeling system
- 16) Compare contact sensors and non-contact sensors for detecting a moving object on a production line. Which is an advantage of a non-contact sensor? [CO4][An]
 - a) It requires physical contact with the object
 - b) It reduces mechanical wear during detection
 - c) It cannot detect moving objects
 - d) It always requires manual operation

Part B

Short Answer Questions

Answer any 6 questions. Each question carries 5 marks

- 17) Explain the evolution from Industry 1.0 to Industry 4.0 and highlight the major technological developments in each industrial revolution. [CO1][U]
- 18) Describe how advanced sensor technologies and robotics support real-time data acquisition and manufacturing processes in Industry 4.0. [CO1][U]
- 19) Illustrate how the CPU, input/output modules, power supply, and communication interfaces work together in an industrial automation system. [CO2][A]
- 20) Show how point-to-point and continuous path motion can be applied to different robotic manufacturing applications. Give suitable examples. [CO2][A]
- 21) Illustrate how DCS and HMI can be integrated to monitor and control an industrial process. [CO3][A]
- 22) Write about suitable communication protocols to connect field devices and controllers in an industrial automation system. [CO3][A]
- 23) Contrast the suitability of proximity, photoelectric, and temperature sensors for different industrial automation applications. Compare their working principles and key characteristics such as accuracy, precision, sensitivity, and resolution. [CO4][An]
- 24) Examine the role of IoT integration and Wireless Sensor Networks in industrial automation. [CO4][An]

Part C

Essay Questions

Answer any 2 questions. Each question carries 12 marks

- 25) Explain the key features and principles of Industry 4.0 and discuss the role of advanced automation, simulation, Edge AI, human-robot collaboration, and sustainable manufacturing practices in the future of smart manufacturing. [CO1][U]
- 26) Write the concepts to design a suitable automation system for an industrial manufacturing process. [CO2][A]
- 27) Illustrate the implementation of an integrated industrial automation system using DCS, HMI, SCADA, servo motors, and industrial communication protocols. [CO3][A]
- 28) Write the analysis of an industrial automation system incorporating different types of sensors, solid-state relays, IoT, Wireless Sensor Networks, and panel wiring. [CO4][A]

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

V SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG5DSEECT306 -INDUSTRIAL AUTOMATION

Duration: 2 hours

Maximum Marks: 70

Students should attempt at least one question from each course outcome to enhance their overall
outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions, Each question carries 1 mark

- | | | | |
|----|---|---|---|
| 1 | What is Industry 4.0 mainly associated with? | | |
| | A) Steam-powered machines B) Mass production and assembly lines | | |
| | C) Smart and connected manufacturing D) Manual production | U | 1 |
| 2 | Which technology enables a robot to understand objects and scenes using cameras? | | |
| | A) Computer vision B) PWM C) Modulation D) Rectification | U | 1 |
| 3 | Which technology is commonly used to create a virtual representation of a physical industrial system? | | |
| | A) Digital Twin B) Barcode C) Spreadsheet D) Compiler | U | 1 |
| 4 | A simulation model of a manufacturing system can be used to study: | | |
| | A) Production flow B) Machine utilization | | |
| | C) Bottlenecks D) All of the above | U | 1 |
| 5 | What does PLC stand for? | | |
| | A) Programmable Logic Controller B) Program Logic Computer | | |
| | C) Process Logic Controller D) Programmable Linear Computer | U | 2 |
| 6 | Motion-control PLCs are commonly used in: | | |
| | A) Robotic systems B) Servo systems | A | 2 |
| | C) CNC machines D) All of the above | | |
| 7 | Which PLC architecture provides greater flexibility and expandability? | | |
| | A) Modular PLC B) Fixed relay system | A | 2 |
| | C) Compact PLC only D) Mechanical controller | | |
| 8 | Which interpolation provides smooth transitions for complex shapes? | | |
| | A) Spline interpolation B) Linear interpolation | | |
| | C) Circular interpolation D) Step interpolation | A | 2 |
| 9 | What does DCS stand for? | | |
| | A) Digital Control System B) Distributed Control System | | |
| | C) Direct Control System D) Data Communication System | U | 3 |
| 10 | What is the main advantage of integrating DCS with HMI? | | |
| | A) Better monitoring and operator control B) Increased manual work | U | 3 |
| | C) Elimination of sensors D) Reduced automation | | |
| 11 | Which servo motor has a commutator? | | |

- | | | | | |
|----|---|---|--------|----------------|
| | A) AC servo motor | B) Brushed DC servo motor | A | 3 |
| | C) Brushless AC servo motor | D) Synchronous AC servo motor | | |
| 12 | Modbus TCP is based on which network technology? | | | |
| | A) Ethernet | B) CAN bus | C) USB | D) RS-232 only |
| | | | A | 3 |
| 13 | In an automated system, the typical sequence is: | | | |
| | A) Actuator → Sensor → Controller | B) Sensor → Controller → Actuator | An | 4 |
| | C) Controller → Sensor → Power supply | D) Actuator → Controller → Sensor | | |
| 14 | What is a major advantage of a Solid-State Relay over a conventional electromechanical relay? | | | |
| | A) It has more moving parts | B) Faster switching and longer operating life | | |
| | C) It requires frequent contact replacement | D) It cannot switch electrical loads | A | 4 |
| 15 | Why is colour coding used in industrial panel wiring? | | | |
| | A) To make wires attractive | | | |
| | B) To easily identify different circuits and functions | | An | 4 |
| | C) To increase wire resistance | | | |
| | D) To reduce cable length | | | |
| 16 | A Cyber-Physical System (CPS) combines: | | | |
| | A) Only mechanical components | | | |
| | B) Computing, communication, and physical processes | | An | 4 |
| | C) Only software applications | | | |
| | D) Only electrical circuits | | | |

16 * 1 = 16

Part B

Short Answer Questions

Answer any **6** Questions, Each question carries 5 marks

- | | | | |
|----|--|----|---|
| 17 | List the key features of Industry 4.0 | U | 1 |
| 18 | Compare traditional automation with advanced Automation | U | 1 |
| 19 | List the advantages of using PLCs in industrial automation. | U | 2 |
| 20 | What is point-to-point (PTP) motion? Give two examples. | A | 2 |
| 21 | List five major benefits of a comprehensively integrated DCS-HMI environment. | A | 3 |
| 22 | Briefly explain CAN and its importance in industry. | A | 3 |
| 23 | Write the principle and working of proximity sensors. | U | 4 |
| 24 | Explain the relevance of color-coding in industrial panel wiring and state the standard color conventions. | An | 4 |

6 * 5 = 30

Part C

Essay Questions

Answer any **2** Questions, Each question carries 12 marks

- | | | | |
|----|--|----|---|
| 25 | Explain the applications of advanced sensor technologies in Industrial manufacturing processes | U | 1 |
| 26 | With the help of suitable diagram explain the hardware architecture of PLC | A | 2 |
| 27 | Define SCADA. Describe the components of SCADA system, | A | 3 |
| 28 | Describe any four key characteristics of Sensors. | An | 4 |

2 * 12 = 24

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

V SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG5DSEECT307

Cyber Security

Duration: 2 hours

Maximum Marks: 70

Students should attempt at least one question from each course outcome to enhance their overall
outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|---|--|----|---|
| 1 | Which type of malware is capable of self-replication without user intervention?
a) Trojan Horse b) Worm c) Spyware d) Adware | U | 1 |
| 2 | Why is cyber law necessary?
A) To regulate activities and address crimes in cyberspace
B) To prevent the use of computers
C) To eliminate Internet communication
D) To reduce software development | U | 2 |
| 3 | Which security device filters network traffic based on predefined rules?
a) Router b) Firewall c) Hub d) Switch | U | 3 |
| 4 | A dictionary attack primarily uses:
A) Random IP addresses B) A list of likely words and passwords
C) Network packets D) Digital certificates | U | 1 |
| 5 | Which of the following provides message integrity?
a) Hash Function b) Firewall c) VPN d) Router | R | 3 |
| 6 | What is hacking?
A) Only the destruction of computer systems
B) The process of exploring, analyzing or modifying computer systems and networks
C) The installation of operating systems
D) The process of formatting a hard disk | U | 1 |
| 7 | What is the primary purpose of cybersecurity regulations?
A) To increase Internet speed
B) To establish rules and standards for protecting digital systems and information | An | 2 |

- C) To eliminate all Internet services
D) To promote social media usage
- 8 Which characteristic of wireless communication creates an important security challenge? U 4
A) Wireless communication cannot be encrypted
B) Wireless devices cannot transmit data
C) Wireless networks require physical cables
D) Signals can propagate through the air and may be intercepted
- 9 Which type of hacker is commonly associated with authorized security testing? R 1
A) Black-hat hacker B) White-hat hacker
C) Malicious insider D) Cybercriminal
- 10 What is regulatory compliance in cybersecurity? U 2
A) Following applicable laws, regulations, standards and security requirements
B) Installing any antivirus program
C) Using social media responsibly
D) Increasing computer memory
- 11 What is the primary security concern when using an unsecured public Wi-Fi network? U 4
A) Improved encryption B) Increased battery capacity
C) Possible interception or manipulation of network traffic
D) Automatic malware removal
- 12 Which cyber attack tricks users into revealing confidential information through fake emails? R 3
a) Spoofing b) Phishing c) Sniffing d) Hijacking
- 13 Which technique uses precomputed tables of password hashes to speed up password recovery? U 1
A) Rainbow-table attack B) DDoS attack
C) Phishing D) Session hijacking
- 14 Which cybercrime involves obtaining another person's confidential information for fraudulent purposes? R 2
A) Identity theft B) Data compression
C) File sharing D) Web hosting
- 15 Which protocol provides secure remote login? U 1
a) Telnet b) SSH c) FTP d) HTTP
- 16 Which security property ensures that mobile data is accessible only to authorized users? R 4
A) Availability B) Confidentiality
C) Compression D) Routing

1 * 16 = 16

Part B

Short Answer Questions
Answer any **6** Questions

Each question carries 5 marks

- | | | | |
|----|--|---|---|
| 17 | What is SQL Injection? | U | 3 |
| 18 | What is a Denial-of-Service (DoS) attack? | R | 1 |
| 19 | What is SSL/TLS? State its purpose. | U | 3 |
| 20 | Identify the major security challenges associated with mobile computing | | 1 |
| 21 | Explain the major security challenges of mobile computing and discuss appropriate countermeasures. | A | 1 |
| 22 | What is cybercrime? Give two examples. | R | 2 |
| 23 | Discuss the legal status and importance of electronic records and digital signatures | U | 2 |
| 24 | Discuss the role of Mobile Device Management (MDM) in protecting organizational mobile devices. | A | 4 |

6 * 5 = 30

Part C

Essay Questions

Answer any **2** Questions

Each question carries 12 marks

- | | | | |
|----|--|----|---|
| 25 | Discuss the importance of ethical hacking and penetration testing in improving cyber security. | U | 1 |
| 26 | Explain the working principles, advantages, and applications of Virtual Private Networks (VPNs). | U | 3 |
| 27 | Analyze the weaknesses of storing passwords using unsalted or fast cryptographic hashes. Explain how modern password-hashing algorithms address these weaknesses. | An | 2 |
| 28 | Explain the different authentication factors and authentication mechanisms used in modern computing. Evaluate their advantages, limitations and suitability for mobile applications. | U | 4 |

2 * 12 = 24

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
V SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)

MG5DSEECT308 ADVANCED PYTHON

Duration: 2 hours

Maximum Marks: 70

Students should attempt at least one question from each course outcome to enhance their overall
outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|---|--|---|---|
| 1 | What will be the output of the following code
x = 10
y = "20"
print(x + y)
a) 30 b) 1020 c) Type Error d) 20 | U | 1 |
| 2 | What is the data type of the variable x, if x=20.5
a) int b) str c) float d) bool | K | 1 |
| 3 | What does the Boolean expression x > 10 and x < 20 check?
a) Whether x is less than 10 or greater than 20
b) Whether x is between 10 and 20
c) Whether x is equal to 10 or 20
d) Whether x is greater than 20 | U | 1 |
| 4 | Why is try-except used in Python?
a) To define variables
b) To repeat statements
c) To handle errors that may occur during program execution
d) To convert strings into numbers | K | 1 |
| 5 | Which file mode is used to open a file for writing?
a) r b) w c) x d) b | U | 3 |
| 6 | What is the advantage of using the 'with' statement when working with files?
a) It automatically closes the file after the block is completed
b) It converts a text file into a binary file
c) It prevents the file from being read
d) It automatically deletes the file | U | 3 |
| 7 | The regular expression which is used to extract all 10-digit mobile numbers from the following text
"Contact numbers are 9876543210 and 9123456789."
a) r'\d{5}' b) r'\d{10}' c) r'\w{10}' d) r'[0-9]{5}' | A | 3 |
| 8 | What does the tell() method return when used with a file | U | 3 |

- | | | | | |
|----|--|---|---|---|
| | a) The size of the file | b) The current position of the file pointer | | |
| | c) The name of the file | d) The number of lines in the file | | |
| 9 | What is an object in Python? | | U | 2 |
| | a) A blueprint for creating classes | b) An instance of a class | | |
| | c) A function inside a class | d) A variable that can only store strings | | |
| 10 | Why is 'self' used in an instance method of a Python class? | | U | 2 |
| | a) To refer to the current object | b) To create a new class | | |
| | c) To access only class variables | d) To terminate the method | | |
| 11 | What happens when the following statement is executed, assuming 'Student' is a class with an appropriate constructor
<code>s1 = Student("Anu")</code> | | A | 2 |
| | a) A new object of the Student class is created | | | |
| | b) The Student class is deleted | | | |
| | c) The constructor is deleted | | | |
| | d) A n instance method is converted into a class variable | | | |
| 12 | Why are namespaces useful in Python? | | K | 2 |
| | a) They help avoid conflicts between names | | | |
| | b) They automatically create objects | | | |
| | c) They convert class variables into instance variables | | | |
| | d) They execute methods automatically | | | |
| 13 | The main purpose of inheritance in Python is | | U | 2 |
| | a) To hide data from users | | | |
| | b) To allow a class to acquire properties and methods from another class | | | |
| | c) To create only private variables | | | |
| | d) To overload operators | | | |
| 14 | What is polymorphism in Python? | | U | 2 |
| | a) The ability of an object or method to take different forms or behave differently in different contexts | | | |
| | b) The process of hiding all variables | | | |
| | c) The process of creating only one object | | | |
| | d) The process of inheriting from one class only | | | |
| 15 | The main purpose of NumPy in Python is | | U | 4 |
| | a) Web development | b) Numerical and scientific computing | | |
| | c) Creating graphical user interfaces | d) File compression | | |
| 16 | Which statement correctly imports NumPy using the commonly used alias | | U | 4 |
| | a) <code>import numpy as np</code> | b) <code>include numpy as np</code> | | |
| | c) <code>import np as numpy</code> | d) <code>using numpy as np</code> | | |

1 * 16 = 16

Part B

Short Answer Questions

Answer any **6** Questions

Each question carries 5 marks

- | | | | |
|----|---|---|---|
| 17 | Explain the different basic data types available in Python with examples. | U | 1 |
| 18 | Write a Python program to accept two numbers from the user and display sum. | A | 1 |
| 19 | Explain the difference between <code>re.search()</code> and <code>re.findall()</code> with suitable examples. | U | 3 |
| 20 | Explain the different file modes <code>r</code> , <code>w</code> , <code>a</code> , and <code>x</code> with examples. | U | 3 |

21	What is the purpose of the <code>__init__()</code> method in a Python class? Give an example.	U	2
22	Write a Python program to create a Student class with attributes name and marks, and display their values using a method.	A	2
23	What is NumPy? Explain its importance in numerical computing with Python.	U	4
24	Explain the different types of polymorphism supported in Python.	U	4
			6 * 5 = 30

Part C

Essay Questions

Answer any **2** Questions

Each question carries 12 marks

25	Write a Python program using a function that accepts two numbers as arguments and returns their sum, difference, product, and quotient.	A	1
26	Develop a Python program that reads a text file and finds all dates in the format DD-MM-YYYY using regular expressions. Explain how the pattern works.	A	3
27	Explain how to define a class and create objects in Python. Write a program to demonstrate the concept.	A	2
28	Create a Python program using Pandas to construct a Data Frame containing student names, marks, and grades. Perform suitable data analysis and display the results.	C	4
			2 * 12 = 24

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

V SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG5DSEECT309 Analog and Digital Communication

Duration: 2 hours

Maximum Marks: 70

Students should attempt at least one question from each course outcome to enhance their overall
outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|----|---|----|---|
| 1 | Which of the following is an essential element of a basic communication system? | U | 1 |
| | a) Oscillator b) Transmitter c) Rectifier d) Regulator | | |
| 2 | In a communication system, the primary function of a transmitter is to: | U | 1 |
| | a) Recover the original message | | |
| | b) Convert the received signal into information | | |
| | c) Process and transmit the information signal through a suitable medium | | |
| | d) Remove the receiver noise | | |
| 3 | Which of the following is a continuous-time signal? | U | 1 |
| | a) Digital signal b) Analog signal c) Binary signal d) Sampled signal | | |
| 4 | Modulation is primarily required to: | U | 1 |
| | a) Eliminate the message signal b) Make transmission practical and efficient | | |
| | c) Convert AC into DC d) Increase receiver noise | | |
| 5 | In amplitude modulation, the amplitude of the carrier is varied according to the: | An | 2 |
| | a) Carrier frequency b) Message signal | | |
| | c) Noise signal d) Sampling frequency | | |
| 6 | The modulation index of an AM wave is related to: | An | 2 |
| | a) Carrier amplitude and message amplitude | | |
| | b) Carrier frequency and message frequency only | | |
| | c) Bandwidth and noise power | | |
| | d) Sampling rate and quantization levels | | |
| 7 | The bandwidth of a standard AM signal containing a message of maximum frequency (f_m) is: | An | 2 |
| | a) (f_m) b) ($2f_m$) c) ($3f_m$) d) ($4f_m$) | | |
| 8 | Frequency modulation is a type of modulation in which the: | An | 2 |
| | a) Carrier amplitude varies b) Carrier phase remains constant | | |
| | c) Carrier frequency varies according to the message signal | | |
| | d) Message frequency is eliminated | | |
| 9 | In phase modulation, the quantity of the carrier that is directly varied is its: | An | 2 |
| | a) Amplitude b) Frequency c) Phase d) Power | | |
| 10 | A digital communication system represents information primarily using: | An | 3 |
| | a) Continuous waveforms only b) Discrete signal levels | | |
| | c) Mechanical vibrations d) Random noise | | |
| 11 | The first basic operation in PCM after sampling is: | An | 3 |
| | a) Amplification b) Quantization c) Demodulation d) Filtering | | |

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU–UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 Admission Onwards)

MG5DSEECT310 Robotics and Industrial Automation

Duration: 1½ Hours

Maximum Marks: 50

Part A

Answer any TEN questions
Each question carries 2 marks

- | | |
|--|-----|
| 1. Define Robotics. | K 1 |
| 2. What is industrial automation? | K 1 |
| 3. Mention any two applications of industrial automation. | U 1 |
| 4. What is an IR proximity sensor? | K 1 |
| 5. Define a servo motor. | K 1 |
| 6. What is a Programmable Logic Controller (PLC)? | K 2 |
| 7. What is Ladder Logic? | U 2 |
| 8. Mention any two types of PLC I/O modules. | K 2 |
| 9. What is meant by PLC–motor interfacing? | U 2 |
| 10. What is a closed-loop control system? | K 3 |
| 11. Mention any two components of an automatic conveyor belt system. | K 3 |
| 12. What is a pick-and-place robot? | U 3 |
| 13. What is a PIR sensor? | K 1 |
| 14. Mention any two types of motors used in robotics. | K 1 |

2 x 10 = 20

Part B

Answer any SIX questions
Each question carries 5 marks

- | | |
|--|------|
| 15. Explain the evolution of robotics and discuss its major applications in industry. | An 1 |
| 16. Explain industrial automation and describe its different types. | An 1 |
| 17. Explain the working principles and applications of IR proximity and PIR sensors. | A 1 |
| 18. Explain the basic concepts and applications of servo motors, geared DC motors and stepper motors. | An 1 |
| 19. Explain the basic structure of a PLC with a neat block diagram and describe the functions of its major components. | An 1 |
| 20. Explain PLC inputs and outputs and describe the different types of I/O modules. | An 2 |

21. Explain the interfacing of a motor with a PLC. Draw a neat block diagram showing the PLC input/output connections and explain the ON/OFF control of the motor using START and STOP push buttons. A 2
22. Explain the working of a closed-loop control system with automatic water-level control as an example. A 3
23. Explain the components and working of an automatic conveyor belt mechanism. An 3
24. Explain the applications of robotics in industry with reference to pick-and-place and spot-welding operations. An 3

5 x 6 = 30

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISSION ONWARDS)

MG5SECECT300 – RESPONSIVE WEB DESIGN AND FRONTEND DEVELOPMENT

Time: 1½ Hours

Maximum Marks: 50

PART A

Answer all questions. Each question carries 1 mark.

1. Which of the following is the primary purpose of HTML? [R, CO1]
a) To structure web page content b) To manage databases
c) To configure web servers d) To develop operating systems
2. Which section of an HTML document contains metadata and the title of the web page? [R, CO1]
a) <body> b) <head> c) <main> d) <footer>
3. Which HTML tag is used to define a paragraph? [R, CO1]
a) <para> b) <p> c) <paragraph> d) <text>
4. Which HTML element is used to create a hyperlink? [R, CO1]
a) <link> b) <href> c) <a> d) <url>
5. Which HTML element is used to create a table? [R, CO1]
a) <table> b) <tab> c) <tbl> d) <grid>
6. Which HTML element is used to provide a multi-line text input area? [R, CO1]
a) <input> b) <textarea> c) <text> d) <multiline>
7. Which HTML element is used to create a drop-down list? [R, CO1]
a) <dropdown> b) <select> c) <list> d) <choice>
8. Which HTML element is used to group related form controls? [U, CO1]
a) <group> b) <fieldset> c) <formgroup> d) <section>
9. Which HTML element is commonly used as a container for basic page layout? [U, CO1]
a) <div> b) <layout> c) <container> d) <box>
10. Which type of CSS is written directly within the style attribute of an HTML element? [R, CO1]
a) Internal CSS b) External CSS c) Inline CSS d) Embedded CSS
11. Which protocol is the secure version of HTTP? [R, CO1]
a) FTP b) HTTPS c) SMTP d) DNS
12. Which system translates domain names into IP addresses? [U, CO1]
a) HTTP b) HTML c) DNS d) CSS
13. jQuery is primarily a: [R, CO2]
a) CSS framework b) JavaScript library
c) Web server d) Database system
14. Which symbol is commonly used as an alias for jQuery? [R, CO2]
a) # b) @ c) \$ d) %
15. Which of the following is an advantage of jQuery? [U, CO2]
a) It simplifies JavaScript programming

- b) It replaces HTML
 - c) It replaces the web browser
 - d) It provides web hosting
16. Which of the following is a valid jQuery selector for an element with the ID menu? [A, CO2]
- a) \$(".menu")
 - b) \$("#menu")
 - c) \$("menu#")
 - d) \$("id.menu")
17. Which jQuery method is used to select the parent of an element? [R, CO2]
- a) .parent()
 - b) .up()
 - c) .ancestor()
 - d) .top()
18. Which jQuery method is used to modify the HTML content of an element? [R, CO2]
- a) .html()
 - b) .modify()
 - c) .content()
 - d) .changeHTML()
19. Which jQuery method is used to add content at the end of selected elements? [R, CO2]
- a) .append()
 - b) .addEnd()
 - c) .insertLast()
 - d) .end()
20. Which jQuery method is used to remove selected DOM elements? [R, CO2]
- a) .delete()
 - b) .remove()
 - c) .erase()
 - d) .clear()
21. Which jQuery method is associated with the hover event? [R, CO2]
- a) .hover()
 - b) .move()
 - c) .pointer()
 - d) .over()
22. Which jQuery event is used to handle the submission of a form? [R, CO2]
- a) send
 - b) submit
 - c) post
 - d) form
23. A form-validation process is mainly used to: [U, CO2]
- a) Check whether entered data satisfies specified conditions
 - b) Change the operating system
 - c) Configure a web server
 - d) Create a database
24. Bootstrap is primarily a: [R, CO3]
- a) Programming language
 - b) CSS framework
 - c) Database system
 - d) Web browser
25. Which Bootstrap feature is used to create structured page layouts? [R, CO3]
- a) Grid system
 - b) DNS system
 - c) Table system
 - d) Server system
26. Which of the following is a Bootstrap component? [R, CO3]
- a) Navbar

- b) DNS
- c) HTTP
- d) Browser

27. Which Bootstrap class is commonly used for buttons? [R, CO3]
- a) .button
 - b) .btn
 - c) .bootstrap-button
 - d) .bbutton
28. Which Bootstrap component is specifically used for website navigation? [U, CO3]
- a) Navbar
 - b) Button group
 - c) Typography
 - d) Grid
29. What is the main objective of responsive web design? [U, CO4]
- a) To make websites adapt to different screen sizes
 - b) To restrict websites to desktop computers
 - c) To eliminate CSS
 - d) To replace HTML
30. Which of the following is a screen category considered when designing responsive websites? [R, CO4]
- a) Mobile
 - b) Server
 - c) Database
 - d) Compiler
31. Which Bootstrap feature can be used to create layouts suitable for different screen sizes? [U, CO4]
- a) Responsive grid system
 - b) Static table system
 - c) Fixed-frame system
 - d) Database system
32. Bootstrap responsive utilities are primarily used to: [U, CO4]
- a) Control display and layout according to screen conditions
 - b) Configure DNS
 - c) Manage databases
 - d) Install operating systems
33. Which Bootstrap classes are used for styling text and headings? [R, CO3]
- a) Typography classes
 - b) Navigation classes
 - c) Grid classes
 - d) Form-control classes
34. Which Bootstrap component is used to group related buttons? [R, CO3]
- a) Button group
 - b) Button panel
 - c) Button container
 - d) Button list
35. A responsive navigation bar containing a dropdown menu can be designed using Bootstrap components. Which combination is most appropriate? [A, CO4]

- a) Navbar and dropdown
- b) Table and image
- c) Grid and paragraph
- d) Form and textarea

PART B

Answer any THREE questions. Each question carries 5 marks.

- 36.** Explain the basic structure of an HTML document. Describe the functions of the <head> and <body> sections. Explain any three commonly used HTML formatting or structural elements. **[U, CO1]**
- 37.** Explain HTML forms and describe the purpose of any five of the following elements: <input>, <textarea>, <select>, <fieldset>, , <iframe> and <a>. **[U, CO1]**
- 38.** Explain jQuery selectors and DOM traversal. Illustrate how jQuery can be used to select elements, modify HTML content, add DOM elements and remove DOM elements. **[A, CO2]**
- 39.** Explain event handling and form validation using jQuery. Describe the use of click, hover and submit events and explain the role of jQuery plugins and custom validation. **[A, CO2]**
- 40.** Design a responsive web page using Bootstrap for mobile, tablet and desktop screens. Explain how the Bootstrap grid system, responsive utilities, typography, buttons, navigation bar and dropdown components can be used to achieve the design. **[A, CO3]**

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

V SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG5SECECT301- MOBILE APP DEVELOPMENT

Duration: 1 hour 30 minutes

Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|----|---|---|---|
| 1. | A program stores 85 as an int and 85.5 as a double. This classification is based on: | U | 1 |
| | A. The size of the variable | | |
| | B. The nature of the numerical value | | |
| | C. The variable name | | |
| | D. The number of statements | | |
| 2. | The expression "Hello " + "Dart" produces: | U | 1 |
| | A. Two separate strings | | |
| | B. A combined string | | |
| | C. A Boolean value | | |
| | D. A numerical value | | |
| 3. | A List containing [10, 20, 30] is suitable for storing student marks because: | U | 1 |
| | A. List maintains a collection of values in an ordered manner | | |
| | B. List stores only key-value pairs | | |
| | C. List automatically removes all values | | |
| | D. List stores only Boolean values | | |
| 4. | Adding a duplicate value to a Set generally results in: | U | 1 |
| | A. Multiple copies being stored | | |
| | B. The duplicate being ignored | | |
| | C. A new Map being created | | |
| | D. The program being terminated | | |
| 5. | A single-line comment in Dart begins with: | U | 1 |
| | A. <!-- | | |
| | B. // | | |
| | C. ## | | |
| | D. /*/ | | |
| 6. | The % operator is used for: | U | 1 |
| | A. Multiplication | | |
| | B. Remainder | | |
| | C. Addition | | |
| | D. Assignment | | |
| 7. | The % operator is used for: | U | 1 |
| | A. Multiplication | | |
| | B. Remainder | | |
| | C. Addition | | |
| | D. Assignment | | |
| 8. | A counter contains 5 and the statement counter++ is executed. The counter becomes 6 because: | U | 1 |
| | A. The increment operator increases the value by one | | |
| | B. The assignment operator replaces the value with zero | | |
| | C. The decrement operator reduces the value | | |
| | D. The logical operator reverses the value | | |
| 9. | A student must satisfy age >= 18 && percentage >= 50 to apply for a course. The && operator represents: | U | 1 |
| | A. Both conditions must be true | | |
| | B. At least one condition must be true | | |
| | C. Both conditions must be false | | |
| | D. Only the first condition is evaluated | | |

10.	The if statement is used for:	U	1
	A. Conditional execution		
	B. Creating classes		
	C. Declaring Lists		
	D. Importing packages		
11.	A loop contains break when a particular value is found. The purpose of break is to:	U	1
	A. Terminate the loop immediately		
	B. Restart the loop		
	C. Skip only the current statement		
	D. Increase the loop counter		
12.	An object created from the Student class represents:	U	1
	A. A specific instance of the Student class		
	B. The class definition itself		
	C. A programming operator		
	D. A conditional statement		
13.	A Car class receives common properties from a Vehicle class. This relationship demonstrates:	U	1
	A. Inheritance		
	B. Encapsulation		
	C. Abstraction only		
	D. Collection handling		
14.	A developer exposes a simple makePayment() operation while hiding the internal payment processing. This demonstrates:	U	1
	A. Abstraction		
	B. Inheritance only		
	C. Looping		
	D. Assignment		
15.	The terminal in VS Code can be used for:	U	2
	A. Running Flutter commands		
	B. Editing images only		
	C. Creating database tables		
	D. Sending notifications		
16.	The command commonly used to check the Flutter installation is:	U	2
	A. flutter check		
	B. flutter doctor		
	C. flutter verify		
	D. flutter install		
17.	A StatelessWidget is suitable for a widget whose state:	U	2
	A. Changes frequently		
	B. Remains unchanged during its lifetime		
	C. Is stored in Firestore		
	D. Requires a database		
18.	Images used in a Flutter application can be included through:	U	2
	A. Assets		
	B. Git branches		
	C. REST APIs only		
	D. Exception classes		
19.	Flutter packages are generally added as dependencies in:	U	2
	A. pubspec.yaml		
	B. main.xml		
	C. index.html only		
	D. README.txt		
20.	REST APIs commonly use HTTP methods such as:	U	2
	A. GET and POST		
	B. DRAW and PRINT		
	C. OPEN and CLOSE		
	D. START and STOP		
21.	A chat application can benefit from:	U	2
	A. WebSockets		
	B. Shared Preferences only		
	C. GitHub only		
	D. Flutter Inspector only		
22.	The Dart keywords commonly associated with exception handling include:	U	2
	A. try, catch, finally		
	B. start, stop, pause		
	C. get, post, put		
	D. build, run, test		
23.	Provider is commonly used in Flutter for:	U	2
	A. State management and dependency access		
	B. Image editing		
	C. Git operations		
	D. API hosting		
24.	In MVVM, the ViewModel mainly handles:	U	2
	A. Presentation-related logic and state		
	B. Image files only		
	C. Git commits		
	D. Flutter installation		
25.	AnimationController is used to:	U	2
	A. Control animation values and timing		
	B. Store application data		
	C. Manage Git repositories		
	D. Generate JSON		
26.	A Flutter application needs to store a small user preference such as isDarkMode = true locally. Which option is most appropriate?	A	3
	A. Firebase Authentication		
	B. Shared Preferences		
	C. Firestore		
	D. Firebase Remote Config		

27. Which option best distinguishes Firestore from Firebase Storage? A 3
 A. Firestore stores documents/data, while Storage stores files
 B. Firestore stores files, while Storage stores user preferences
 C. Both are authentication services
 D. Both are local databases
28. Which of the following can be used with Firebase Authentication? A 3
 A. Email and password B. Google Sign-In
 C. Phone authentication D. All of the above
29. A Flutter application receives continuous location updates from a device. Which Dart construct is most suitable? A 3
 A. Future B. Stream
 C. String D. Shared Preferences
30. Which operation is used to modify an existing Firestore document? A 3
 A. Update B. Create
 C. Download D. Compile
31. Firebase Remote Config allows developers to: A 3
 A. Change app behavior/configuration remotely B. Store images locally
 C. Write SQL queries D. Test widgets
32. Which collection stores key-value pairs in Dart? A 3
 A. List B. Set
 C. Map D. Queue
33. Identify the function commonly used to select elements based on a condition? A 3
 A. map() B. where()
 C. sort() D. join()
34. A shopping application needs to test the complete flow: A 3
 Login → Select Product → Add to Cart → Checkout
 Which testing approach is most suitable?
 A. Unit testing B. Widget testing only
 C. Integration testing D. Shared Preference testing
35. A Flutter application is experiencing slow animations and dropped frames. Which DevTools feature should the developer primarily use to investigate the issue? A 3
 A. Performance tools B. Shared Preferences
 C. Firebase Authentication D. Unit testing only

1 * 35 = 35

Part B

Short Answer Questions

Answer any **3** Questions

Each question carries 5 marks

36. Describe the use of int, double, String, and bool data types in Dart with suitable examples. U 1
37. Differentiate between StatelessWidget and StatefulWidget in Flutter with suitable examples. U 2
38. Compare the application of Provider and BLoC for managing changing application state in a Flutter application. U 2
39. Demonstrate the application of Firebase Authentication for implementing email and password-based user login. A 3
40. Explain the application of Flutter Inspector and DevTools for identifying layout, performance, and memory-related issues in a Flutter application. A 3

5 * 3 = 15

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

V SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG5SECECT302- Low Voltage System for Building Management

Duration: 1 hour 30 minutes

Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries 1 mark

- | | | | |
|---|--|---|---|
| 1 | BMS stands for: | U | 1 |
| | A) Building Monitoring Service | | |
| | B) Building Management System | | |
| | C) Building Mechanical System | | |
| | D) Building Maintenance Software | | |
| 2 | Which is NOT a main objective of BMS? | U | 1 |
| | A) Reducing operating costs | | |
| | B) Improving comfort | | |
| | C) Increasing unnecessary energy consumption | | |
| | D) Enhancing safety | | |
| 3 | The main purpose of a BMS communication network is to: | U | 1 |
| | A) Establish data pathways | | |
| | B) Generate heat | | |
| | C) Store water | | |
| | D) Detect smoke directly | | |
| 4 | What is the main function of sensors in a BMS? | U | 1 |
| | A) Collect information about building conditions | | |
| | B) Generate electricity | | |
| | C) Store data permanently | | |
| | D) Operate elevators only | | |
| 5 | Occupancy sensors can help save energy by: | U | 1 |
| | A) Turning lights off in empty rooms | | |
| | B) Increasing lighting continuously | | |
| | C) Increasing HVAC output in empty rooms | | |
| | D) Increasing water consumption | | |
| 6 | The User Interface is also called the: | A | 2 |
| | A) Management layer | | |
| | B) Field layer | | |
| | C) Output layer | | |
| | D) Sensor layer | | |
| 7 | Controllers are mainly located at the: | A | 2 |
| | A) Automation Level | | |
| | B) Field Level only | | |
| | C) Management Level only | | |
| | D) Utility level | | |
| 8 | BMS helps maintain: | A | 2 |

- A) Optimal HVAC operating conditions
 B) Uncontrolled HVAC operation
 C) Maximum energy use
 D) Minimum ventilation always
- 9 Lux sensors measure: A 2
 A) Ambient daylight B) Temperature
 C) Pressure D) Humidity
- 10 The primary benefit of PA/voice evacuation integration is: A 2
 A) Effective emergency communication
 B) Energy generation
 C) HVAC cooling
 D) Water management
- 11 The main benefit of integrating lighting with BMS is: A 2
 A) Efficient and convenient lighting control
 B) Increased energy wastage
 C) Reduced automation
 D) Increased manual operation
- 12 A fire alarm system can detect: A 4
 A) Smoke B) Heat
 C) Fire conditions D) All of the above
- 13 Access control is particularly important for: An 3
 A) Restricted areas B) Open parking spaces only
 C) Building roofs only D) HVAC ducts
- 14 Elevator management supports: A 2
 A) Vertical transportation B) HVAC only C) Security only D) Lighting only
- 15 Intrusion detection supports: An 3
 A) Building security B) HVAC operation
 C) Lighting only D) Water management
- 16 What is the primary purpose of an HVAC system? A 2
 A. To control building lighting
 B. To maintain a comfortable indoor environment
 C. To control elevators
 D. To manage water supply
- 17 What does AHU stand for? A 3
 A. Automatic Heating Utility B. Air Handling Unit
 C. Air Heating Utility D. Automatic Humidity Unit
- 18 Which of the following can be removed through proper ventilation? U 1
 A. Odors B. Pollutants
 C. Excess moisture D. All of the above
- 19 What is one of the most important purposes of lighting in modern buildings? A 2
 A. Water conservation
 B. Providing visibility, safety, comfort, and productivity
 C. Controlling air pressure
 D. Managing elevators
- 20 Instead of operating lights continuously at full brightness, dimming allows: A 2
 A. Lighting levels to be varied B. Lights to be permanently OFF
 C. Current to remain constant D. Lamps to be removed

- 21 What happens when the resistance of the rheostat is decreased? A 2
 A. Less current flows through the lamp
 B. More current flows through the lamp
 C. The lamp switches OFF
 D. The circuit becomes open
- 22 When does the TRIAC automatically turn OFF? A 2
 A. When the capacitor is fully charged
 B. At the next zero-crossing point of the AC waveform
 C. When the resistance is reduced
 D. When the lamp reaches maximum brightness
- 23 HVAC systems contribute significantly to: A 2
 A. Occupant comfort, health, and productivity
 B. Building construction only
 C. Water storage
 D. Fire protection only
- 24 What happens when occupants are detected in a space? A 2
 A. HVAC conditioning can be increased
 B. HVAC is permanently switched OFF
 C. Ventilation is eliminated
 D. All sensors are disabled
- 25 Airflow sensors can help optimize: A 2
 A. Ventilation rates B. Lighting schedules
 C. Water pressure D. Room furniture
- 26 What does PLC stand for? A 2
 A. Power Logic Circuit
 B. Programmable Logic Controller
 C. Programmable Lift Control
 D. Power Line Controller
- 27 What is a relay? A 2
 A. A temperature measuring device
 B. An electrically operated switching device
 C. A ventilation device
 D. A power generator
- 28 Which of the following is a common application of relays in BMS? A 2
 A. Lighting systems B. HVAC equipment
 C. Security systems D. All of the above
- 29 What is the main purpose of notification appliances? An 4
 A) Detect flames
 B) Communicate a fire alarm condition to building occupants
 C) Identify individual detectors
 D) Store alarm records
- 30 Flame detectors are particularly useful when a fire: An 4
 A) Develops very slowly
 B) Produces visible flame rapidly before smoke reaches a conventional detector
 C) Produces no radiation
 D) Occurs only outdoors
- 31 RFID stands for: A 3

- | | | | | |
|----|---|------------------------------------|-------------------|----------------|
| | A) Radio Frequency Identification | B) Remote Fire Identification | | |
| | C) Radio Frequency Indicator Device | D) Resistance Field Identification | | |
| 32 | What is a major function of energy management in a BMS? | | U | 1 |
| | A) Reduce unnecessary energy consumption | B) Increase energy wastage | | |
| | C) Disable monitoring | D) Eliminate all sensors | | |
| 33 | Which device is commonly used to measure electrical energy consumption? | | A | 3 |
| | A) Smart meter | B) PIR sensor | C) Smoke detector | D) RFID reader |
| 34 | Which device converts the DC output of a solar PV system into AC? | | A | 3 |
| | A) Inverter | B) Transformer only | C) Relay | D) Thermostat |
| 35 | What is a major benefit of an integrated energy-management strategy? | | A | 3 |
| | A) Better coordination of energy generation, storage, and consumption | | | |
| | B) Increased unnecessary electricity consumption | | | |
| | C) Increased dependence on the grid | | | |
| | D) Elimination of energy monitoring | | | |

1 * 35 = 35

Part B

Short Answer Questions

Answer any **3** Questions

Each question carries 5 marks

- | | | | |
|----|---|----|---|
| 36 | What is the main purpose of a CCTV surveillance system? | U | 1 |
| 37 | Explain the construction and working principle of rheostat dimming. | A | 2 |
| 38 | Explain the purpose and importance of HVAC systems in modern buildings. | A | 2 |
| 39 | Explain the fundamental purpose of an IDS in protecting a building. | A | 3 |
| 40 | Describe the working principle of an optical smoke detector | An | 4 |

3 * 5 =15