

Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap's
ASHOKRAO MANE GROUP OF INSTITUTIONS

Vathar Tarf Vadgaon-416112 Tal. Hathkangle, Dist Kolhapur

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QUESTION PAPER: (B.Tech/M.Tech/MBA)

Semester: 5th

Class: TY.B.Tech

Year: Feb-2025

Department: All Branch

1. Civil Engineering
2. Mechanical Engineering
3. Computer Science and Engineering
4. Electronics and Tel communication Engineering
5. Electrical Engineering
6. AIDS
7. Computer Science And Electronics Engineering



Instructions for the Students:

- Each question carries 12 marks.
- Question No. 1 will be compulsory and include objective-type questions.
- Candidates are required to attempt any five questions from Question No. 2 to Question No. 6.
- The level of questions/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
- Use of non-programmable scientific calculators is allowed.
- Assume suitable data wherever necessary and mention it clearly.

		(Level CO)	Marks				
Q.1.	Objective type questions. (Compulsory Question)		12				
1.	Which type of data can be stored in the database?		1				
	<table> <tr> <td>a. Image oriented data</td><td>b. Text, files containing data or video</td><td>c. Data in the form of audio or video</td><td>d. All of the above</td></tr> </table>	a. Image oriented data	b. Text, files containing data or video	c. Data in the form of audio or video	d. All of the above		
a. Image oriented data	b. Text, files containing data or video	c. Data in the form of audio or video	d. All of the above				
2.	Database languages can be used to _____ the data in the database.		1				
	<table> <tr> <td>a. Read</td><td>b. Store</td><td>c. Update</td><td>d. All of the Mentioned.</td></tr> </table>	a. Read	b. Store	c. Update	d. All of the Mentioned.		
a. Read	b. Store	c. Update	d. All of the Mentioned.				
3.	A database is _____ with Data Manipulation Language.		1				
	<table> <tr> <td>a. Accessed and Multiplied</td><td>b. Added and Manipulated</td><td>c. Access and Manipulated</td><td>d. Added and Multiplied</td></tr> </table>	a. Accessed and Multiplied	b. Added and Manipulated	c. Access and Manipulated	d. Added and Multiplied		
a. Accessed and Multiplied	b. Added and Manipulated	c. Access and Manipulated	d. Added and Multiplied				
4.	What is a relation in RDBMS?		1				
	<table> <tr> <td>a. Key</td><td>b. Table</td><td>c. Row</td><td>d. Data Types</td></tr> </table>	a. Key	b. Table	c. Row	d. Data Types		
a. Key	b. Table	c. Row	d. Data Types				
5.	The function that an entity plays in a relationship is called the entity's _____.		1				
	<table> <tr> <td>a. Participation</td><td>b. Position</td><td>c. Role</td><td>d. Instance</td></tr> </table>	a. Participation	b. Position	c. Role	d. Instance		
a. Participation	b. Position	c. Role	d. Instance				
6.	The descriptive property possessed by each entity set is _____.		1				
	<table> <tr> <td>a. Entity</td><td>b. Attribute</td><td>c. Relation</td><td>d. Model</td></tr> </table>	a. Entity	b. Attribute	c. Relation	d. Model		
a. Entity	b. Attribute	c. Relation	d. Model				

7	Database _____, which is the logical design of the database, and the database _____ which is a snapshot of the data in the database at a given instant in time.	a. Instance, Schema	b. Relation, Schema	c. Relation, Domain	d. Schema, Instance		
	The intersection operator is used to generate _____ tuples.	a. Different	b. Common	c. All	d. Repeating		
	The number of attributes in relation is called as its _____.	a. Cardinality	b. Degree	c. Tuples	d. Entity		
10	A unit of storage that can store one or more records in a hash file organization is denoted as _____.	a. Buckets	b. Disk pages	c. Blocks	d. Nodes		
11	A hash function must meet _____ criteria.	a. Two	b. Three	c. Four	d. None of the Mentioned		
12	Which of the following makes the transaction permanent in the database?	a. View	b. Commit	c. Rollback	d. Flashback		
Q. 1	Solve the following.						
A)	Define an Entity and Attribute. Explain the different types of attributes that occur in ER diagram model with an example.						
B)	Draw the symbols of ER diagram. Draw a diagram for library management system.						
Q. 2	Solve the following.						
A)	Define and differentiate the following relational algebra operators with suitable example 1. Cartesian product 2. Natural join						
B)	What is relational algebra? Explain basic operations along with symbols of relational algebra.						
Q. 3	Solve Any Two of the following.						
A)	What is view what are its advantages explain views in SQL with example.						

B)	What is normalization? Why we need to normalize the database tables.			8
C)	Write the SQL syntax for the following with the example. 1. Select 2. Alter 3. Update			8
Q.3	Solve Any Two of the following.			12
A)	Explain 1 st , 2 nd and 3 rd normal form with the help of suitable example			8
B)	What are the features of good relational Design?			8
C)	Explain The Static Hashing and Dynamic Hashing.			8
Q.4	Solve Any Two of the following.			12
A)	Define transaction and their properties with suitable example.			8
B)	Explain ACID properties in details.			8
C)	Explain Time Stamp-Based Protocols.			8
*** End ***				

DR. BABASAHEB AMTEDEKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: B. Tech Branch: Computer Engineering/Computer Science and Engineering

Subject Code & Name: HTECS02, Theory Of Computation

Semester: V

Max.Marks: 60

Date: 06/01/2025

Duration: 3 Hrs.

Instructions to the Students:

Each question carries 12 marks

Question No. 1 will be compulsory and all other objective-type questions

Candidates are required to attempt any four questions from Question No. 2 to Question No. 5

The level of question/expected answer is as per COs of the Course Outcome (CO) as indicated in the question is listed in mentioned in (1) in front of the question

1. Use of non-programmable scientific calculators is allowed

2. Answer suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks	
Q.1	Objective type questions. (Compulsory Question)		12	
Q.2	Which of the following is not a part of 3-tuple finite automata?	Understand	1	
	a. Input alphabet	b. Transition function	c. Initial State	d. Output Alphabet
	$\mathbb{R}^*$ can be expressed in which of the forms:			
	a. $\mathbb{R}^+$	b. $\mathbb{R}^+ \cup \mathbb{R}$	c. $\mathbb{R}$	d. $\mathbb{R}^*$
Q.3	The number of states required by an automaton to accept string 011 are	Analyse	1	
	a. 3	b. 4	c. 5	d. 2
Q.4	Regular expression for string that start with ab and end with ba is	Design	1	
	a. $ab(a^*)^*ba$	b. $ab(a^*)ba$	c. $ab(a^*b)^*ba$	d. All of these
Q.5	Regular expressions are closed under	Understand	1	
	a. Union	b. Concatenation	c. Closure Star	d. All of these
Q.6	Which grammar is in Context normal form (CNF)?	Understand	1	
	a. $S \rightarrow AAB, A \rightarrow aB, B \rightarrow b$	b. $A \rightarrow aB, B \rightarrow b$	c. $S \rightarrow aAB, B \rightarrow b$	d. None of these
Q.7	Finite machine produces output over the change of	Understand	1	
	a. Transitions	b. state	c. input symbol	d. None of these
Q.8	Can Deterministic Finite automata determine palindromic number?	Analyse	1	
	a. yes	b. no	c. yes for even cases	d. yes for 2^n

Q.1	A grammar that produces more than one parse tree is called				Understand
	a. regular	b. ambiguous	c. unambiguous	d. none	
	The language accepted by Pushdown automata is				Understand
	a. type 0	b. type 1	c. type 2	d. type 3	
Q.2	The language is recognized by Turing machine if it is generated by _____ grammar				Understand
	a. type 0	b. type 1	c. type 2	d. type 3	
	The Pushdown automata behaves like Turing machine if it has auxiliary memory				Understand
	a. 0	b. 1	c. infinite stack	d. finite of finite	
Q.3	Solve the following.				
A	State some applications of regular expressions. Write regular expressions for the following				Create
	(i) one 'a' followed by some number of 'b's				
	(ii) some positive number of 'a's followed by exactly one 'b'				
	(iii) start and end with 'a' and in between by some 'b's				
B	Design deterministic finite automata which consists of strings of 0's and 1's but ends with string 00, over alphabet $\Sigma = \{0,1\}$.				Design
Q.4	Solve the following.				
A	Construct an explicit non deterministic finite automata (NFA) accept either a or ab or a^*b^* .				Create
B	Distinguish between Moore machine and Mealy machine				Understand
Q.5	Solve Any Two of the following.				
A	Let the grammar consists of following productions				Apply
	$S \rightarrow aAS \mid a$				
	$A \rightarrow SBA \mid SS \mid ba$				
	Find the leftmost and rightmost derivations for string $aabbba$. Also draw the parse trees.				
B	Explain Chomsky classification of grammar				Understand
C	Construct finite automata for the following grammar.				
	$S \rightarrow aA \mid \epsilon$, $A \rightarrow aAbB \mid \epsilon$, $B \rightarrow bB \mid \epsilon$				
Q.6	Solve Any Two of the following.				
A	Find the reduced grammar equivalent to following context free grammar where $V = \{A, B, C, S\}$, $T = \{a, b\}$ and $P = \{S \rightarrow AB \mid CA,$				Apply

S → BCAB, A → a, C → aB (b, 1)			
B	Explain the components of Pushdown automata.	Understand	6
C	Explain with example how Pushdown automata is represented using transition diagram and transition table.	Understand	6
Sub: Any Two of the following.			
C	Distinguish between tape and head of Turing machine and Pushdown automata.	Understand	6
	Design Turing machine to accept the language of 0's and 1's ending with 00.	Design	6
	Give an example of Turing machine which has an infinite loop and never halts.	Analyze	6
*** End ***			

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DR. BAKASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: B. Tech

Semester: V

Marks: 60

Branch: Computer Engineering/ Computer Science And Engg

Subject Code: Software Engineering (ITCOC-M3)

Date: 11/02/2025

Duration: 3

Instructions to the Students:

Each question carries 12 marks.

Question No. 1 will be compulsory and include objective-type questions.

Candidates are required to attempt any four questions from Question No. 2 to

Question No. 6. The level of question/expected answer to get OFF in the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.

5. Use of non-programmable scientific calculators is allowed.

6. Assume suitable data wherever necessary and mention it clearly.

		Level/CO	Mark
Q.1	Objective-type questions. (Compulsory Questions)		
062171623	Which of the following aspects of software development is central to Heron's Law? a) Writing clean and clever code b) Handling trade-offs and design decisions c) Dependence on all observable behaviours of an API d) Ensuring compatibility with various programming languages		062171623
062171623	Why is scalability an essential focus in Software Engineering? a) It simplifies debugging and testing processes. b) It ensures software can handle increasing demands effectively. c) It reduces the number of programming languages used. d) It minimises the time required for development.		062171623
062171623	Which software principle emphasizes breaking down a system into smaller, self-contained modules? a) Abstraction b) Modularity c) Encapsulation d) Single Responsibility Principle		062171623
062171623	What is the purpose of a Minimum Viable Product (MVP) in software development? a) To finalize software design for large-scale deployment b) To validate design, requirements, and new business ideas c) To reduce the time required for product launch d) To build software without feedback from end users		062171623
062171623	Which of the following best describes a Minimum Viable Product (MVP)? a) A fully functional software product ready for deployment b) A prototype designed for internal use only c) A version of the product with core features to validate design		062171623

	and requirements d) A set of software components developed from a shared codebase		
6	Which of these is NOT a characteristic of DevOps? a) Continuous delivery of software b) Automation of repetitive tasks c) Sequential and rigid development cycle d) Integration of development and IT operations		
7	What is the primary purpose of version control systems (VCS) like Git? a) Social networking b) Managing changes to files over time c) Creating graphics for software projects d) Developing software without collaboration		
8	In Git, what does the git pull command do? a) Copies a repository from a remote server to local storage b) Fetches and merges changes from a remote repository c) Deletes a branch from the remote repository d) Creates a new branch in the local repository		
9	In the context of software testing, what does test coverage measure? A. The efficiency of test execution B. The compatibility of the software across platforms C. The amount of application code exercised by the tests D. The performance of code under stress		
10	Why is it important to test edge cases in software testing? A. To ensure basic functionality works B. To test scenarios with minimal inputs C. To handle unusual or extreme input values D. To avoid unnecessary test cases		
11	What is the main purpose of static code analysis (SCA)? A. To execute the code and detect runtime errors. B. To identify potential issues and vulnerabilities without executing the code. C. To refactor code automatically based on best practices. D. To improve execution speed during runtime.		
12	What is NOT a key benefit of code review? A. Finding defects B. Sharing code ownership C. Automated debugging of runtime errors D. Improving code readability		
Q1	Solve the following.		
A)	In the context of Software Engineering, describe a scenario where addressing trade-offs (e.g., security versus usability) is critical. How would you approach deciding on such a scenario?		
B)	Compare the advantages and disadvantages of the Waterfall Model and Agile Methodology in software process models. When would each be appropriate?		
Q2	Solve the following.		

A)	Compare and contrast the roles of individual effort in computer programming and collaboration in software engineering. How do effective collaboration and version management tools enhance the software development process?		*
B)	Discuss the role of stakeholders such as product teams and operations teams in ensuring the success of a software project. How do their responsibilities differ?		*
C)	Solve Any Two of the following. DevOps emphasizes automation and continuous delivery. Explain the role of tools such as CI/CD pipelines and containerization in achieving these goals. Provide examples of how companies like Netflix or Uber have benefited from these practices.		*
B)	Discuss the role of the .gitignore file in Git repositories. Why is it important, and how does it improve the efficiency of version control? Provide an example of a typical .gitignore file content.		*
C)	You are working on a new feature in your project and want to create a separate workspace to avoid impacting the main branch. Which Git command would you use to create and switch to a new branch named feature-xyz?		*
Q3	Solve Any Two of the following.		*
A)	Discuss the differences between Distributed Version Control Systems (DVCS) and Centralized Version Control Systems (CVCS). How does DVCS address the limitations of CVCS?		*
B)	Discuss the cultural challenges faced by organizations adopting DevOps practices. What strategies can be implemented to overcome resistance and ensure successful integration?		*
C)	You accidentally committed sensitive information (e.g., API keys) into your repository. Which Git command would you use to remove the last commit but keep the changes in your working directory?		*
Q4	Solve Any Two of the following.		*
A)	Explain the differences between unit testing, integration testing, and user acceptance testing. What are test fixtures, and why are they useful in software testing?		*
B)	Describe the role of documentation in improving code quality. What are the key best practices for conducting effective code reviews?		*
C)	How does virtualization enable application compatibility testing? Explain how resource optimization is achieved through virtualization.		*

DR. BAKSHABAI AMBASTKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2021

Course: B.Tech. **Branch:** Computer Science and Engineering & Allied **Semester:** 5

Subject Code & Name: BTEDC003 & Software Engineering

Max. Marks: 50

Date: 11/02/2021

Duration: 90

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any 10 questions from Question No. 2 to Question No. 6.
4. The level of questions/expected answer will be COB or the Course Outcome (CO) on which the question is based is mentioned in / or below of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		Level(CO)	Marks
Q.1	Objective type questions. (Compulsory Question)		12
1	Which one of the following activities would span all stages of a software development life cycle (SDLC) in waterfall-based software development?	Remember	1
	a. Coding b. Testing c. Project management d. Design		
2	Which of the following are not the characteristics of an agile software development project?	Remember	1
	a. Shared code ownership b. Implement the simplest solution to meet today's problem c. Continuous feedback from customer d. Postpone integration until all the incremental deliveries are complete		
	For programming intends to take which one of the following best practices to the extreme?	Remember	1
	a. Design b. Incremental development c. Code review d. Simplicity		

4	Consider the following partial requirement for a software: "It should be possible to use a web browser as the front end." It can be considered to be which one of the following types of requirements? a. Functional requirement b. Non-functional requirement c. Design constraint d. External interface	Remember
	Which one of the following most accurately defines the term software process model? a. The way in which software is developed b. The way in which software processes data c. The way in which software is used d. The way in which software behaves	Remember
5	Which one of the following phases accounts for the maximum effort during development of a typical software product? a. Coding b. Testing c. Designing d. Specification	Remember
	Which one of the following phrases would most appropriately complete the sentence: "The later a defect is found during a traditional software development cycle _____" a. the less troublesome it is b. the more expensive it is to repair c. the less important it is to the product's operation d. the more important it is to the product's operation	Remember
	Which one of the following statements is true concerning unit testing? a. Carried out by the development team b. Involves testing the system as a whole c. Often carried out by a separate testing team d. Carried out by the customers	Remember
6	Which one of the following types of bugs may not get detected in black-box testing, but are very likely to be get detected by white-box testing?	Remember

	a. Increment functionality b. Missing functionality c. Improve d. Incorrect operation		
10	Which of the following is not a part of Software evolution?	Remember	1
	a. An engineering activities b. Maintenance activities c. Development activities d. Negotiating with client		
11	Which of the following UML diagrams, tell a static view?	Remember	1
	a. Collaboration b. Use case c. State chart d. Activity		
12	Which diagram in UML, shows a complete or partial view of the structure of a modeled system at a specific time?	Remember	1
	a. Sequence Diagram b. Collaboration Diagram c. Class Diagram d. Object Diagram		
Q.3	Solve the following.		12
A)	Explain the software Engineering code of ethics and professional practice.	CO1	6
B)	Explain software process activities.	CO1	6
Q.3	Solve the following.		12
A)	Discuss the Extreme Programming process.	CO2	6
B)	What is agile Software Development? Discuss advantages.	CO2	6
Q.4	Solve Any Two of the following.		12
A)	What is system model? Explain types of system models in brief.	CO3	6

B)	What are the Architectural patterns? Explain Model view controller (MVC) pattern	CO3	1
C)	Explain in brief i) Context Models and ii) Interaction models	CO3	1
Q.5	Solve Any Two of the following.		10
A)	What is software reuse? Explain software reuse levels.	CO4	1
B)	Draw sequence diagram for ATM.	CO4	1
C)	Discuss Object Oriented Design using UML in brief.	CO4	1
Q.6	Solve Any Two of the following.		10
A)	Explain test driven development with neat sketch.	CO5	1
B)	Compare software inspection and testing	CO5	1
C)	Discuss Component testing in detail.	CO5	1
	*** End ***		



DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONER

Regular/Supplementary Winter Examination - 2024

Course: B.Tech

Branch: Computer Engineering /Computer Science and Engg

Subject Code & Name: BTCE0504A(Human Computer Interaction)

Semester: IV

Max.Marks: 60

Date:13/02/2025 Duration: 3 Hr.

Instructions for the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of questions/expected answer as per OBM or the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data whenever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Objective type questions. [Compulsory Question]		12
1	It virtual reality which of the senses cannot currently be portrayed?	1	1
	a. Touch b. Hearing c. smell d. sight		
	Which of the following field is not influenced on HCI	1	1
	a. Ergonomics b. Cognitive Science c. Computer science d. All of these		
2	HCI stand for?	2	1
	a. Human Computer Interaction b. Human Computer Interface c. Human Computer Interface d. Human Computer Implementation		
3	Which of these is not an interface style?	1	1
	a. Command Line b. Menu c. Natural Language d. Voice Recognition		
4	Which of these is not an interface style?	2	1
	a. Personal Computing b. Hypertext c. Multi-modality d. All of these		
5	semantic network is a?	2	1
	a. A model of Short term memory b. A model of Long term Memory c. A model of Physical Memory d. None of Above		
6	WWW stand for?	2	1

	a. World-wide web	b. World wide web	c. None of these	d. All of these	
8	Which approach is not present for user support.				1
	a. Command assistance	b. online tutorial	c. face to face Communication	d. Command Prompt	
	Explain GOMS ?				1
	a. Goal Operator	b. Method	c. Selection	d. All of These	
	Cognitive model represents				1
	a. interactive user	b. Design of model	c. Scales	d. All of these	
11	Different applications of hypermedia				1
	a. Education	b. Training	c. Business	d. All of these	
12	All stand for?				1
	a. Augmented reality	b. Artificial Reality	c. All of these	d. All of these	
Q.1	Solve the following.				
	Explain input output channel with respect to vision.				1
B)	Write a short note on Human Memory				1
Q.3	Solve the following.				
A)	Explain the software life cycle Model in detail.				1
B)	State & explain golden rule of design.				1
Q.4	Solve Any Two of the following.				
A)	Explain different element of Windowing System.				1
B)	Analyze Multimodal Interaction.				1
C)	Evaluate Model through expert analysis.				1
Q.5	Solve Any Two of the following.				
A)	Discuss Goal and Task Hierarchy in Cognitive Model.				1
B)	Explain Face to Face communication in detail.				1

Q. 1	Write a note on GOMS.	1	1
Q. 2	Solve Any Two of the following.		2
A1	Explain concept of Virtual and augmented reality.	1	1
A2	Explain Concept of Groupware system.	1	1
A3	Compare Static and Dynamic web content.	1	1
*** ***			

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular and Supplementary Winter Examination – 2024

Course: B. Tech. Branch: Electronics & Telecommunication Engineering / Electronics and Communication Engineering

Semester: V

Subject Code & Name: Electromagnetic Field Theory (BTECS001)

Max Marks: 60

Date: 06/02/2025

Duration: 3 Hr.

Instructions to the Students:

- Each question carries 12 marks.
- Question No. 1 will be compulsory and include objective-type questions.
- Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.
- The level of question/expected answer as per CO or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
- Use of non-programmable scientific calculator is allowed.
- Give suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1 Objective type questions. (Compulsory Question)			12
1	The surface integral of a vector field represents:		1
	a) circulation b) divergence c) flux d) curl		
2	According to Coulomb's law, the force between two charges is:		1
	a) independent of the distance b) directly proportional to the distance		
	c) inversely proportional to the square of the distance d) directly proportional to the square of the distance		
3	Gauss's law is useful in calculating electric fields for _____ type of charge distributions		1
	a) random b) symmetrical c) asymmetrical d) time-dependent		
4	SI unit of magnetic flux density is:		1
	a) Tesla b) Weber c) Ampere/meter d) Henry		
5	The tangential component of $\mathbf{B}$ across a boundary:		1
	a) is discontinuous b) is zero		
	c) is continuous d) depends on the current density		
6	Which Maxwell's equation relates to Faraday's law of induction?		1
	a) $\nabla \times \mathbf{E} = -\partial \mathbf{B} / \partial t$ b) $\nabla \cdot \mathbf{B} = 0$ c) $\nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \mu_0 \epsilon_0 \partial \mathbf{E} / \partial t$ d) $\nabla \cdot \mathbf{E} = \rho / \epsilon_0$		
7	The displacement current term in Maxwell's equations is introduced for:		1
	a) Account for magnetic monopoles b) Eliminate the electric field		
	c) Replace conduction current d) Satisfy the continuity equation for time-varying fields		
8	On a Smith Chart, a clockwise movement represents:		1
	a) Moving toward the load b) Moving away from the load		
	c) No change in the distance from the load d) Reflection coefficient approaching 1		
9	In vector form, Maxwell's curl equation $\nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \mu_0 \epsilon_0 \partial \mathbf{E} / \partial t$ becomes:		1
	a) $\nabla \times \mathbf{B} = -\mu_0 \mathbf{J}$ b) $\nabla \times \mathbf{B} = \mu_0 \mathbf{J}$ c) $\nabla \times \mathbf{B} = -\partial \mathbf{B} / \partial t$ d) $\nabla \times \mathbf{B} = 0$		
10	A uniform plane wave in a lossless dielectric medium satisfies the relation:		1
	a) $\nabla \cdot \mathbf{E} = 0$ b) $\nabla \cdot \mathbf{B} = 0$ c) $\nabla \times \mathbf{E} = -\partial \mathbf{B} / \partial t$ d) Both a) and b)		
11	For oblique incidence, the Brewster angle is the angle at which:		1
	a) Reflection coefficient is maximum b) Transmission coefficient is zero		
	c) Reflection coefficient is zero for parallel polarisation d) Electric field is perpendicular to the boundary		
12	The angle θ between $\mathbf{A} = 3\mathbf{a}_x - 4\mathbf{a}_y + 2\mathbf{a}_z$ and $\mathbf{B} = 5\mathbf{a}_x + 6\mathbf{a}_y + 3\mathbf{a}_z$ is:		1
	a) 0° b) 90° c) 120° d) 180°		

Q. 2 Solve the following.

- A) Given vectors $P = 3a_x + 2a_y$ and $Q = a_x - 2a_y$, calculate the following:
(a) $P \cdot Q$
(b) $3P + 2Q$
(c) angle between P and Q
- B) State and prove Stoke's Theorem.

Q.3 Solve the following.

- A) Derive the continuity equation for charge conservation. Explain the significance of equation in the context of current flow in conductors.
- B) State the Biot-Savart Law, calculate the magnetic field at a point due to a current I flowing through a long straight wire.

Q.4 Solve Any Two of the following.

- A) State Faraday's Law of induction. Derive the mathematical expression for the induced emf in a coil of wire when subjected to a changing magnetic field.
- B) State and explain the gradient of a scalar field and find the gradient of the scalar field $U = x^2 yz + yz^2$
- C) Derive the boundary conditions for the electric and magnetic fields at the interface between two different media.

Q.5 Solve Any Two of the following.

- A) Derive the general wave equations for voltage and current on a transmission line. Discuss the role of the characteristic impedance in these equations.
- B) Define (i) VSWR and (ii) reflection coefficient.
A transmission line with a characteristic impedance of $Z_0 = 50\Omega$ is terminated with a load impedance of $Z_L = 75\Omega$.
1. Calculate the reflection coefficient at the load.
2. Determine the VSWR for this system.
- C) Explain the concept of the Smith Chart and its application in the analysis of transmission lines.

Q.6 Solve Any Two of the following.

- A) State Maxwell's equations in phasor form for time-harmonic fields. Discuss the significance of each equation in describing the behavior of electric and magnetic fields in space and time.
- B) Explain the concept of polarization in electromagnetic waves. Differentiate between linear, circular, and elliptical polarization.
- C) A uniform plane wave of 75 Hz propagating through Copper conductor having $\sigma = 5.8 \times 10^7 \text{ S/m}$, $\epsilon_r = 1$, $\mu_r = 1$. Find (i) attenuation constant, (ii) phase constant, (iii) propagation constant, (iv) intrinsic impedance, (v) wavelength and (vi) phase velocity.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course & Tech.

Branch: Electronics & Telecommunication Engineering

Semester: V

Subject Code & Name: ETET0401 – Electromagnetic Field Theory ETETAC001_V18

Max. Marks: 60

Date: 11/12/2024

Duration: 3 hrs.

Instructions to the Students:

Each question carries 12 marks.

Question No. 1 will be compulsory and include objective-type questions.

Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.

The level of questions/expected answer as per CO or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.

- 1. Use of non-programmable scientific calculator is allowed.
- 2. Assume suitable data wherever necessary and mention it clearly.

					Level/CO	Marks
062172978	Q. 1 Objective type questions. (Compulsory Questions)					12
	1. The value for permittivity of free space is ϵ_0				Understand,	1
	a. 8.854×10^{-12} F/m	b. 8.254×10^{-12} F/m	c. 8.854×10^{-10} F/m	d. 8.854×10^{-11} F/m	Remember	
062172978	Coulomb's Law describes the force between two point charges and is proportional to:				Understand	1
	a. The product of the charges	b. The square of the charges	c. The inverse square of the distance between the charges	d. The distance between the charges		
062172978	2. The Biot-Savart Law is used to calculate:				Understand	1
	a. The electric field due to a moving charge	b. The magnetic field due to a current	c. The potential due to a static charge	d. The energy stored in a magnetic field		
062172978	3. According to Ohm's Law, the current density J is related to the electric field E by				Understand	1
	a. $J = \sigma E$	b. $J = \rho E$	c. $J = \epsilon E$	d. $J = \mu E$		
4. Example of spherical system in the following is					Understand	1

	a. change in space	b. change in dielectric	c. change in loss	d. change in system		
6	In a time-harmonic electric field, the displacement current density J is related to:				Understand	
	a. The rate of change of the electric field	b. The conductivity of the medium	c. The magnetic field intensity	d. The electric potential	Understand	
	The characteristic impedance of a transmission line is denoted by				Understand	
	a. Z_0	b. $Z_1 Z_0$	c. Z_1	d. Z_L	Understand	
	For maximum power transfer, the load impedance Z_L must be				Understand	
	a. Equal to the characteristic impedance Z_0	b. Greater than the characteristic impedance Z_0	c. Less than the characteristic impedance Z_0	d. Zero	Understand	
7	The Smith Chart is used for				Understand	
	a. Measuring power in the transmission line	b. Calculating the frequency response	c. Impedance matching and reflection coefficient analysis	d. Determining the electric field in the line	Understand	
	The Poynting theorem describes the:				Understand	
	a. Flow of electromagnetic energy in a wave	b. Reflection of electromagnetic waves at boundaries	c. Polarisation of electromagnetic waves	d. Power dissipation in a resistive medium	Understand	
11	In a uniform plane wave, the electric field and magnetic field are:				Understand	
	a. Perpendicular to each other and to the direction of wave propagation	b. Parallel to each other and to the direction of wave propagation	c. Parallel to the direction of wave propagation	d. Perpendicular to the direction of wave propagation only	Understand	
12	The wave equation for an electromagnetic wave in free space is derived from				Understand	

	a. Maxwell's equations	b. The principle of superposition	c. Coulomb's Law	d. The Helmholtz equation		
Q.1	Solve the following.					12
Q.2	State Coulomb's Law. By Using Coulomb's Law calculate the electrostatic force between two-point charges, $Q_1 = +5\mu\text{C}$ and $Q_2 = -3\mu\text{C}$ separated by a distance of 0.3 m.				Understand, Remember	8
	Explain Point form of Gauss's Law.				Understand	8
	Solve the following.					12
Q.3	a) State Biot-Savart Law and derive the expression for the magnetic field intensity due to infinite long filament.				Understand, Remember	8
	b) Explain the Ampere's Circular Law.				Understand	8
Q.4	Solve Any Two of the following.					12
	State and explain the Maxwell's equations.				Understand	8
	Derive the expression for the electric and magnetic fields of a plane wave in free space.				Understand, Remember	8
	State Faraday's Law of Induction.				Understand, Remember	8
Q.5	Solve Any Two of the following.					12
Q.6	a) Define:				Understand	8
	1) Propagation constant					
Q.7	2) VSWR					
	Write short note on Smith chart.				Understand	8
	Explain impedance Matching in transmission lines using a neat diagram.				Understand, apply	8
Q.8	Solve Any Two of the following.					12
	State and derive Poynting theorem.				Understand, Remember	8

44 = 280

B)	Define polarization and differentiate linear, circular, and elliptical polarization (any 4 points)	Understand
C)	With the help of diagram explain the reflection of plane wave.	Understand, apply
*** End ***		

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Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 2 will be compulsory and includes objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.
4. The level of question/expected answer will be CO in the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Q.1 Objective type questions. (Compulsory Question)

1. In an open-loop control system:

CO-1

12

- | | | | |
|-------------------------------------|--|---|---|
| a. Output is fed back to the input. | b. Output is independent of the input. | c. Output is dependent on the input but has feedback. | d. System performance is always self-adjusting. |
|-------------------------------------|--|---|---|

CO-1

1

2. What is the main goal of block diagram reduction techniques?

- | | | | |
|---|--|---|---------------------------------------|
| a. To increase the complexity of a system representation. | b. To simplify the system into a single transfer function. | c. To determine the state-space representation. | d. To avoid using Laplace transforms. |
|---|--|---|---------------------------------------|

CO-1

1

3. Which of the following is NOT a standard test signal?

- | | | | |
|----------------|----------------|---------------------|-----------------------------|
| a. Step signal | b. Ramp signal | c. Parabolic signal | d. Exponential decay signal |
|----------------|----------------|---------------------|-----------------------------|

CO-1

1

4. Which of the following is a design specification for a second-order system?

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6. a. Overshoot b. Settling time c. Steady-state error d. All of the above
- CO 1 1
7. The Routh-Hurwitz criterion determines:
- a. The exact location of poles b. The stability of the system c. The time-domain response d. The system's gain margin.
- CO 2 1
8. The root locus always starts at:
- a. Poles of the open-loop transfer function. b. Zeros of the open-loop transfer function. c. Imaginary axis d. Origin of the s-plane.
- CO 2 1
9. Root locus is plotted for which type of system parameter?
- a. Time constant b. Gain K c. Frequency d. Input signal
- CO 2 1
10. In a Bode magnitude plot, the slope of -20 dB/decade indicates:
- a. A first-order system pole. b. A second-order system pole. c. A zero in the transfer function. d. A system with no poles or zeros.
- CO 2 1
11. The primary function of a proportional controller is to:
- a. Eliminate steady-state error. b. Improve system stability. c. Provide a control action proportional to the error signal. d. Speed up the transient response.
- CO 3 1
12. A lag compensator is primarily used to:
- a. Increase the phase margin of the system. b. Improve steady-state accuracy by increasing low-frequency gain. c. Speed up the transient response. d. Decrease system stability.
- CO 3 1
13. For pole-placement, the system must be:
- CO 1 1

- a. Observable b. Controllable c. Diagonalizable d. Stable

Q. 3 State variables are:

- a. Independent variables representing system inputs. b. Variables representing the internal state of a system. c. Constants defining system behavior. d. Variables only used in nonlinear systems.

CO-1 1

Q. 4 Solve the following:

- a. Compare and contrast open-loop and closed-loop control systems with suitable examples. b. Explain the basic rules of block diagram reduction with an example.

CO-1 2

CO-1 2

Solve the following:

Derive the time response of a first-order system for a unit step input.

CO-1 2

State and explain the initial value theorem and its application in analyzing system behavior.

CO-1 2

Q. 4 Solve Any Two of the following:

- a. The characteristic equation of a system is given as follows $s^3 + 3s^2 + 7s + k = 0$. Find the range of values of k for which the system would be stable.

CO-1 2

Draw the root locus diagram for a closed loop system whose loop transfer function is given by:

CO-1 2

$$G(s)H(s) = \frac{K}{s(2s+1)(s+10)}$$

Also find if the system is stable or not.

- b. Sketch the root locus of the system whose open loop transfer function is $G(s)H(s) = \frac{K}{s(2s+1)(s+4)}$

CO-1 2

Q.5 Solve Any Two of the following.

A) Draw the magnitude bode plot for the system having the following transfer function: $G(s)H(s) = \frac{1000(s+1)}{s(s+10)(s+40)}$

B) Obtain the transfer function of Lead Compensator, draw pole-zero plot and write the procedure for design of Lead Compensator using Bode plot.

Draw the polar plot of $G(s) = \frac{1}{(1+s)}$

Q.6 Solve Any Two of the following.

A) Consider the following plant of the state space representation: Examine the controllability and observability of a state space formed by the system

$$A = \begin{bmatrix} 0 & 1 \\ -3 & -3 \end{bmatrix}, B = \begin{bmatrix} -3 \\ 2 \end{bmatrix}, C = [-2 \quad 0]$$

a) Write short note on phase margin and gain margin.

b) Describe the rules to construct root locus of a system.

For a unity feedback control system $G(s) = \frac{10(s+2)}{s(1+s)}$ calculate the position, velocity, acceleration error constant.

... ..

CO-2

12

CO-1

12

B-2

12

CO-1

12

CO-1

12

B-1

12

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Course: B. Tech.

Semester: IV

Branch: Electronics and Telecommunication Engineering/Electronics Engineering

Subject Code & Name: Digital Signal Processing (18EC302, 18EC302)

Max. Marks: 80

Date: 08/02/2025

Duration: 3 Hrs

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and includes objective type questions.
3. Candidates are required to attempt any 04 questions from Question No. 2 to Question No. 5.
4. The level of question/expected answer as per COs or the Course Outcome (CO) or where the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Q. 1 Objective type questions. (Compulsory Question)

1. Why is quantization necessary in DSP?

- a) To improve resolution
- b) To convert to binary
- c) To reduce noise
- d) To amplify signals

CO1

1

Which of the following is NOT a requirement for DSP?

- a) Data Sampling
- b) Quantization
- c) Signal Compression
- d) Modulation

CO1

1

The DFT of $\delta(n)$ (unit impulse) is

- a) 1
- b) N
- c) $\frac{1}{N}$
- d) 2π

CO1

1

4. Parseval's theorem in DTFT relates:

- a) Energy in time and frequency
- b) Power in time and frequency
- c) Periodicity of signals
- d) Linearity of signals

002 1

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Scaling in the time domain corresponds _____ in the frequency domain?

- a) Convolution
- b) Compression
- c) Expansion
- d) Time scaling

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002 1

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5. Which method can be used to compute linear convolution using circular convolution?

- a) Zero-padding
- b) Truncation
- c) Windowing
- d) Scaling

002 1

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002 1

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The main advantage of FFT over DFT is:

- a) Higher accuracy
- b) Reduced computational complexity
- c) Reduced memory requirements
- d) Simplicity

002 1

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The Z-transform is particularly useful for analyzing:

- a) Continuous systems
- b) Discrete systems
- c) Analog systems
- d) Random systems

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002 1

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9. For Z-transform, the ROC must:

- a) Contain infinity
- b) Contain the unit circle
- c) Be bounded
- d) Exclude all poles

100

1

Power transformation involves:

- a) Mixing
- b) Frequency warping
- c) Phase distortion
- d) Oscillation

9

1

10. The inverse Z-transform is used to:

- a) Find the Z-domain representation
- b) Convert a signal back to the time domain
- c) Compute the Fourier transform
- d) Find the region of convergence

100

1

In multirate signal processing, an up-sampler is used to:

- a) Increase the sampling rate
- b) Decrease the sampling rate
- c) Increase the frequency of the signal
- d) Decrease the frequency of the signal

100

1

Q.3 Solve the following.

A) Write the applications of Digital Signal Processing.

Explain the term aliasing with neat diagrams. Explain various cases: under sampling, over sampling and critical sampling. What can be done to combat the effect of aliasing?

B) Solve the following.

A) State and prove any four properties of DTFT.

B) Determine the DTFT of the signals:

- i) $x[n] = \cos(\omega_0 n)$
- ii) $x[n] = \cos(\omega_0 n)$

10

100

1

100

1

10

100

1

100

1

Q.4 Solve Any Two of the following.

- A) i) Compute the 4-point DFT of $x[n] = [1, -1, 1, -1]$ for $0 \leq n \leq 3$.
 ii) Compute the 4-point IDFT of $X[k] = [0, 2, 0, 2]$ for $0 \leq k \leq 3$.
 B) Use overlap-save method to convolve the following sequences:
 $x[n] = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]$ for $0 \leq n \leq 9$
 and $h[n] = [1, 0, -1]$ for $0 \leq n \leq 2$

Draw the sample ROC corresponding to the following system characteristics:

- Causal and stable
- Causal and unstable
- Anti-causal and stable
- Anti-causal and unstable
- Non-causal and stable
- Non-causal and unstable

Q.5 Solve Any Two of the following.

- A) Determine the Z-Transform and ROC of the following signals:

- $x[n] = (1, 2, 3, 4)$ for $0 \leq n \leq 3$
- $x[n] = (1, 2, 3, 4)$ for $-3 \leq n \leq 3$
- $x[n] = (1, 2, 3, 4)$ for $-3 \leq n \leq 0$
- $x[n] = \delta[n]$
- $x[n] = u[n]$
- $x[n] = a^n u[n]$

- B) Derive expression of $y[n]$ and draw the direct form-I and direct form-II realizations of the transfer function given by

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

- C) Explain the concept of an ideal filter. What are the key requirements for a filter to be considered ideal?

Q.6 Solve Any Two of the following.

If $H(z)$ was designed using bilinear transformation, determine its parent causal analog transfer function

$$H(z) = \frac{4(z^2 + 3z + 4)}{10z^2 + 9z + 6}$$

- Derive the expression to obtain the order of a Butterworth filter.
- Explain the applications of multirate digital signal processing.

*** End ***

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The part of question/explicit answer as per COs in the Course Outcome (CO) at which the question is based is mentioned in () in front of the question.
5. Use non-programmable scientific calculator only.
6. Answer suitable data wherever necessary and mention it clearly.

Q. No.	Level	Marks
1. Objective type questions. [Compulsory Question]		12
1. Why is modulation necessary in a communication system?		1
a) To reduce signal power b) To prevent signal distortion		
c) To enable long-distance transmission d) To minimize interference		
2. Sampling theorem states that a continuous-time signal can be completely represented in its samples if the sampling frequency is		1
a) Equal to the signal frequency b) Twice the highest signal frequency		
c) Half the highest signal frequency d) Independent of the signal frequency		
3. Multiplexing is used in communication systems to		1
a) Reduce bandwidth requirements b) Combine multiple signals into one		
c) Enhance signal strength d) Improve signal quality		
4. What happens when the modulation index exceeds 1 in AM?		1
a) Improved signal quality b) Overmodulation, leading to distortion		
c) Reduced carrier power d) No effect on signal		
5. The bandwidth of an AM signal is equal to		1
a) Twice the message signal frequency b) The carrier frequency		
c) Half the message signal frequency d) The message signal frequency		
6. Which type of AM has a full carrier and both sidebands?		1
a) DSB-FC b) DSB-SC c) SSB-SC d) VSB		
7. In PM, the instantaneous phase deviation is proportional to		1
a) Integral of the message signal b) Amplitude of the message signal		
c) Frequency of the carrier signal d) Bandwidth of the carrier		
8. Deemphasis is applied at the receiver to		1
a) Enhance high-frequency noise b) Amplify low-frequency signals		
c) Cancel pre-emphasis effects d) Enhance the carrier signal		
9. Image Frequency Rejection Ratio (IFRR) measures the receiver's ability to		1
a) Reject noise in the signal b) Suppress image frequencies		
c) Amplify weak signals d) Enhance signal fidelity		
10. AGC helps in improving		1
a) Fidelity of the receiver b) Selectivity of the receiver		
c) Stability of the signal strength d) Oscillator frequency stability		
11. Which of the following is a natural source of noise?		1
a) Thermal noise b) Cosmic noise c) Industrial noise d) Shot noise		
12. The envelope detector is commonly used for		1
a) Frequency Modulated (FM) signals b) Phase Modulated (PM) signals		
c) Amplitude Modulated (AM) signals d) Suppressing noise		

Q. 2	Solve the following. A) Differentiate between simplex, half-duplex, and full-duplex communication systems with examples. B) Define Modulation, explain necessity of modulation in a communication system.	CO 01, 07 CO 02, 04
Q. 3	Solve the following. A) Explain DSB-SC variant of AM. Derive the expression for the total transmitted power of a DSB-SC signal. B) A VSB transmitter that transmits 20 % of the opposite sideband along with the desired sideband radiates 125 W when the modulation percentage is 70%. Calculate the total power required to transmit the same message using an AM transmitter.	CO 02, 03 CO 02, 04
Q. 4	Solve Any Two of the following. A) Compare Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Modulation (PM). B) Define the terms : (a) Pre-emphasis, (b) De-emphasis, (c) Narrowband FM and (d) Wideband FM C) In an FM system, when the Audio Frequency (AF) is 700 Hz, and the AF voltage is 1.2 V, the deviation is 2.4 kHz. If the AF voltage is now increased by 3.6 V, what is new deviation? If the AF voltage is further raised to 7.2 V while the AF is dropped to 500 Hz, what is the deviation? Find modulation index in each case.	CO 02, 07 CO 01 CO 05, 06
Q. 5	Solve Any Two of the following. A) Explain the performance characteristics of the receiver. B) Describe the Tuned Radio Frequency (TRF) receiver architecture and its advantages and disadvantages. C) Explain double spotting with its cause and effect. Explain how it can be reduced.	CO 02, 06 CO 02, 04 CO 01
Q. 6	Solve Any Two of the following. A) Explain operation of ratio detector. Also explain how amplitude limiting can be achieved using ratio detector. B) Define Noise Figure, Noise Factor, and explain their relationship in evaluating the noise performance of electronic devices. C) Explain the operation of an Envelope Detector in AM demodulation, and discuss its advantages and limitations.	CO 01, 06 CO 06 CO 02, 04

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular and Supplementary Winter 2024
Course: B. Tech. Branch: Electronics & Telecommunications Engineering / Electronics and Communication Engineering

Subject Code & Name: BTETTESMA Analog Comm

Semester: V

Max Marks: 60

Date: 13/02/2025

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and includes objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.
4. The level of question expected answer as per COs in the Control Document (CD) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Answer valuably data wherever necessary and mention it clearly.

		(Level / CO)	Marks
Q.1	Objective type questions. (Compulsory Question)		12
1	The input impedance of an ideal operational amplifier is:	(L1)	1
	A. Zero B. High but finite C. Infinite D. Equal to the output impedance		
2	The concept of a virtual short in an operational amplifier means:	(L2)	1
	A. Both inputs are physically shorted B. The two inputs have the same voltage C. The output is directly shorted to the input D. The operational amplifier is in saturation		
3	What is the primary purpose of negative feedback in operational amplifier circuits?	(L2)	1
	A. To increase the bandwidth B. To stabilize the gain C. To increase the input impedance D. All of the above		
4	An instrumentation amplifier is typically used for:	(L3)	1
	A. High-power applications B. High-frequency signal processing		

- C. Precise and low-noise signal amplification
- D. High-speed switching

3. A scaling amplifier is designed to:

- A. Perform differentiation
- B. Perform integration
- C. Scale input voltages by different factors
- D. Sum input voltages equally

4. A clipper circuit is primarily used to:

- A. Limit the amplitude of a signal
- B. Integrate a signal
- C. Differentiate a signal
- D. Amplify a signal

5. Precision rectifiers are preferred over standard diode rectifiers because:

- A. They operate at high frequencies
- B. They provide rectification without forward voltage loss
- C. They reduce signal distortion
- D. All of the above

6. An oscillator is a circuit that:

- A. Amplifies a signal
- B. Converts AC to DC
- C. Produces a periodic output signal without an input
- D. Filters out unwanted signals

7. Which of the following is NOT a sinusoidal oscillator?

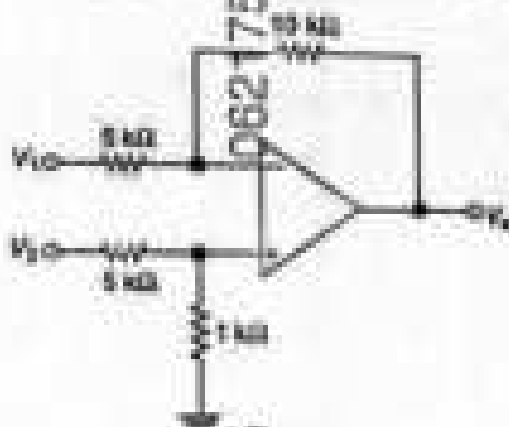
- A. Wien bridge oscillator
- B. Colpitts oscillator
- C. Hartley oscillator
- D. Square wave oscillator

8. In a V-I (voltage-to-current) converter, the output is:

- A. A voltage proportional to the input voltage
- B. A current proportional to the input voltage
- C. A frequency proportional to the input voltage
- D. A resistance proportional to the input voltage

9. The main advantage of a dual-slope ADC is:

- A. Speed

	B. Simplicity		
	C. Noise immunity and accuracy		
	D. Compatibility with high-frequency signals		
12	A relaxation oscillator uses which device for switching?	(1.1)	1
	A. Operational amplifier		
	B. Comparator		
	C. Transistor or op-amp		
	D. All of the above		
Q.2	Solve the following.		12
	A) Explain the different types of feedback in Operational Amplifier?	(1.1)	6
	B) Give the characteristics of Ideal Op-amp?	(1.2)	6
Q.3	Solve the following.		12
	A) Derive an expression for Non-Inverting amplifier?	(1.1)	6
	B) Calculate the output voltage V_o for the circuit shown	(1.1)	6
			
Q.4	Solve the following.		12
	A) Write a short note on clipper circuit?	(1.1)	6
	B) Explain the Non-Inverting Comparator?	(1.1)	6
	C) Explain Positive Precision Full Wave Rectifier?	(1.2)	6
Q.5	Solve the following.		12
	A) Discuss square wave oscillator?	(1.1)	6

B)	Discuss the factors affecting stability of oscillators?	(1.5)
C)	Classify different types of oscillator?	(1.5)
Q. 4 Solve Any Two of the following.		
A)	Write a short note on Difference Amplifier and derive its expression?	(1.5)
B)	Write a note on: Voltage to current converter using op-amp with Ground Load?	(1.5)
C)	Find the output voltage of R-2R D/A converter where input voltage is 10V and digital input is (B) ₁₀ . Also find the resolution of the converter?	(1.5)
*** End ***		

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Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per COs in the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data whenever necessary and mention it clearly.

		Level/ CO	Marks
Q. 1	Objective type questions. (Compulsory Questions)		12
1	In DSP, a "causal" system is defined as one where: a. The system's output depends only on future values of the input b. The system's output depends on both current and future input values c. The system's output depends only on present and past values of the input d. The system's output is periodic	L1/ CO1	1
2	What is the significance of the frequency response of a system in DSP? a. It describes how the system affects the time-domain signal b. It provides information about the system's behavior in the z-domain c. It gives insight into how the system responds to different frequency components d. It determines the pole-zero locations of the system in the z-plane	L1/ CO1	1
3	What is the main purpose of the Discrete Fourier Transform (DFT)? a. To convert a time-domain signal into a continuous-time signal b. To convert a continuous-time signal into a discrete-time signal c. To analyze the frequency content of a discrete-time signal d. To filter high-frequency components from a signal	L1/ CO1	1

4	Which of the following is a common application of the Fast Fourier Transform (FFT)? a. Convolution of two signals b. Implementation of a low-pass filter c. Efficient computation of the Discrete Fourier Transform (DFT) d. Modeling of continuous-time signals	L1/ CO1	1
5	Which of the following is the correct relationship between the z-transform and the Fourier Transform? a. The z-transform is the discrete-time counterpart of the Laplace transform. b. The z-transform evaluates the frequency response at the unit circle in the z-plane. c. The Fourier Transform can only be used for continuous-time signals. d. The z-transform is used to analyze continuous-time systems.	L1/ CO1	1
6	The output of a linear time-invariant (LTI) system is the convolution of the input signal with the system's impulse response. The Fourier transform of the system's output is given by: a. The product of the Fourier transforms of the input signal and the system's impulse response. b. The sum of the Fourier transforms of the input signal and the system's impulse response. c. The inverse of the product of the Fourier transforms of the input signal and the system's impulse response. d. The derivative of the Fourier transform of the input signal and the system's impulse response.	L1/ CO2	1
7	In a FIR (Finite Impulse Response) filter, what is true about its impulse response? a. It is infinite in duration. b. It is non-zero only for a finite number of samples. c. It must be periodic. d. It is a combination of infinite impulse responses.	L1/ CO3	1
8	Which of the following is true about an IIR (Infinite Impulse Response) filter? a. The impulse response is non-zero for a finite number of samples. b. The filter's output depends only on the current and previous inputs. c. The impulse response is non-zero for an infinite number of samples. d. IIR filters are always stable.	L1/ CO3	1

8	What does the term "aliasing" refer to in the context of digital signal processing? a. The loss of signal information during analog-to-digital conversion b. The effect of higher frequencies appearing as lower frequencies when sampled below the Nyquist rate c. The filtering of unwanted frequencies from a signal d. The conversion of a discrete-time signal to a continuous-time signal	L1/ CO1	1
9	Which of the following filters is commonly used to remove high-frequency noise from a signal? a. High-pass filter b. Band-pass filter c. Low-pass filter d. Notch filter	L1/ CO1	1
10	The "all-pass filter" is used primarily to: a. Enhance low-frequency components of a signal. b. Attenuate high-frequency noise c. Modify the phase of a signal without affecting its magnitude d. Create a low-pass filter response	L1/ CO1	1
11	What is the primary purpose of a "window function" in the context of the Fourier transform? a. To filter the signal's frequency components b. To reduce spectral leakage by limiting the signal duration c. To make the signal periodic d. To increase the signal's bandwidth	L1/ CO1	1
Q.1	Solve the following.		12
1)	A continuous-time signal $x(t)$ is obtained at the output of an ideal low-pass filter with cut-off frequency $\omega_c = 1000\text{ rad/s}$. If instantaneous sampling is performed on $x(t)$, which of the following sampling periods will guarantee that $x(t)$ can be recovered properly from its sampled version using an appropriate low-pass filter? 1. $T_s = 0.5 \times 10^{-3}$ 2. $T_s = 2 \times 10^{-3}$ 3. $T_s = 10^{-3}$	L1/ CO1	4
2)	State & explain sampling and reconstruction of signal in digital signal processing.	L1/ CO1	4
Q.2	Solve the following.		12
1)	Determine the DFT of the following sequence: $x[n] = \sin^2\left(\frac{n\pi}{4}\right)$ for $n=0$ to 7	L1/ CO1	4

Page 3

B)	Perform circular convolution (4 points) of the following Sequences: $x_1(n) = (1, 2, 1, 0)$ & $x_2(n) = (1, 4, 1, 2, 1)$	L2/ CO3	
Q.4	Solve Any Two of the following.		
A)	Compute 8-point DFT of the following sequence using Decimation in Time -Fast Fourier Transform(DITFT) method: $x(n) = (1, 2, 3, 4, 4, 3, 2, 1)$	L1/ CO1	
B)	Find the linear convolution of the following two signals using overlap & -save method $x(n) = (1, 1, 0, 1, 1, 0, 1, 1, 2)$ & $h(n) = (1, 1)$	L3/ CO2	
C)	Find the IZT (Inverse Z - Transform) using partial fraction method. $X(z) = \frac{z^{-1} + z^{-2}}{(1 - \frac{1}{2}z^{-1})(1 - \frac{1}{4}z^{-1})(1 - z^{-1})}$ ROC: $1/2 < z < 1$	L3/ CO1	
Q.5	Solve Any Two of the following.		
A)	Using bilinear transform, find following Butterworth filter parameter which satisfy condition, $0.8 \leq H(e^{j\omega}) \leq 1$ for $0 \leq \omega \leq 0.2\pi$ $ H(e^{j\omega}) \leq 1$ for $0.6\pi \leq \omega \leq \pi$ 1. Order of filter 2. Cut-off frequency 3. Finding value of poles	L1/ CO3	
B)	Design digital FIR filter with following specification, $H(e^{j\omega}) = \begin{cases} 1 & 0 \leq \omega \leq \pi/4 \\ 0 & \pi/4 < \omega < 3\pi/4 \\ 1 & 3\pi/4 < \omega \leq \pi \end{cases}$ Use rectangular window, take length $M=5$	L1/ CO3	
C)	Describe up & down sampling in Multi rate sampler with neat sketch.	L2 /CO4	
Q.6	Solve Any Two of the following.		
A)	Illustrate the use of multi rate Digital Signal Processing in the following applications. 1. Implementation of a narrow band low pass filter 2. Filter banks.	L3/ CO4	
B)	Consider a causal LTI system with system function given by, $H(z) = 1 - (1/3)z^{-1} + (1/6)z^{-2} + z^{-3}$. Draw the direct form and transpose structure of the system.	L3/ CO1	
C)	Describe Multi rate DSP & explain how it is used in communication system with proper data & sketch.	L2/ CO5	

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination - 2024

Course: B.Tech

Branch: (Electronics and Telecommunication Engineering) / Electronics and Communication Engineering

Subject Code & Name: BTET0303A Control System Engineering

Semester: V

Max Marks: 60

Date: 22/02/2025

Duration: 3

Instructions to the Students:

1. Each question carries 12 marks.

2. Question No. 1 will be compulsory and includes objective-type questions.

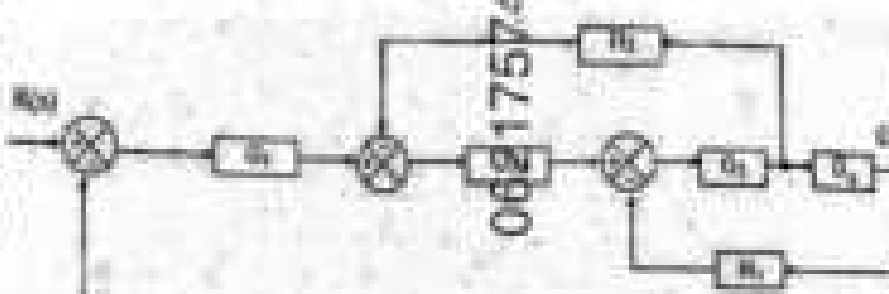
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.

4. The level of questions/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.

5. Use of non-programmable scientific calculators is allowed.

6. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q.1 Objective type questions. (Compulsory Question)			12
1. In four-voltage energy, Mass element is equal to _____		L1/CO1	1
a. Resistance b. Inductance c. Capacitance d. Conductance			
2. For impulse input, the output response $C(t)$ is equal to.		L1/CO1	1
a. $F(t)$ b. $E(t)$ c. $G(t)$ d. $H(t)$			
3. The position and velocity error constants for type-2 system are		L1/CO1	1
a. Constant, constant b. constant, infinity c. zero, constant d. infinity, infinity			
4. Velocity error constant of a system is measured when the input to the system is unit		L1/CO1	1
a. Parabolic b. ramp c. impulse d. step			
5. In case of type-1 system steady state error for parabolic input is		L1/CO1	1
a. unity b. infinity c. zero d. 50			
6. The stability of the system can be increased by adding _____		L1/CO1	1
a. Pole b. zero c. both d. none			
7. If from the bode plots it is observed that the gain cross over frequency is smaller than phase cross over frequency, the system is called		L2/CO1	1
a. Stable b. Marginally stable c. Conditionally stable d. Unstable			
8. The slope of $(1+j\omega)$ is		L3/CO1	1
a. $+20dB$ b. $+40dB$ c. $-40dB$ d. $-20dB$			

11	The function of the proportional plus integral mode is to _____? a. Provide gain b. Eliminate offsets c. To speed up the response and minimize the overshoot d. All of the above	12/CO4
12	The PD controller is very effective for _____ processes? a. slower b. faster c. both d. none of these	11/CO4
13	The smallest set of variable of a state is called _____ a. state b. condition of state c. Eigen values d. state variables	11/CO5
14	State space analysis is applicable even if the initial conditions are _____ a. Zero b. Non-zero c. Equal d. Not equal	11/CO5
Q. 2	Solve the following.	
A)	For the system represented in the given figure, determine transfer function $C(s)/R(s)$ 	13/CO1
B)	Find the overall transfer function of the system whose signal flow graph is shown below. 	15/CO1
Q. 3	Solve the following.	
A)	Control system is having an unity feedback and $G(s) = \frac{20}{s(1 + 4s)(1 + s)}$ Determine: 1) Type of System 2) Static Error Coefficients 3) Steady state error if input is $r(t) = 2 + 4t + \frac{t^2}{2}$	13/CO2
B)	Derive an expression for rise time and peak time	15/CO2

Q.4	Solve Any Two of the following.		12
A)	Determine the stability of $s^7 + s^6 + 2s^5 + 2s^4 + 3s^3 + 3s^2 + 3s + 3 = 0$	LS/CO1	6
B)	Draw the Bode plot and find gain margin and phase margin for the following Transfer Function $G(s)H(s) = \frac{10}{s^2 + (8s + 5)}$	LS/CO3	6
C)	Sketch the polar plot for the open loop transfer function of a unity feedback system is given by $G(s) = \frac{2s}{s(1 + 2s)}$. Also determine Gain Margin & Phase.	LS/CO1	6
Q.5	Solve Any Two of the following.		12
A)	Differentiate between phase lead and lag compensation	LS/CO4	6
B)	Obtain the transfer function of Lead Compensator, draw pole-zero plot and write the procedure for design of Lead Compensator using Bode plot.	LS/CO4	6
C)	The open loop transfer function of a uncompensated system is $G(s) = \frac{5}{s(s+2)}$. Design a suitable lag compensator for the system so that the static velocity error constant $k_v = 20$ sec, phase margin is at least 5° and the gain margin is at least 10.	LS/CO4	6
Q.6	Solve Any Two of the following.		12
A)	Obtain the state model for the system with transfer function $\frac{F(s)}{U(s)} = \frac{3s+4}{s^2+3s+6}$	LS/CO5	6
B)	Obtain State Transition matrix of the system $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 0 & -3 \end{bmatrix} x(t)$	LS/CO5	6
C)	Comment on Controllability and Observability of System $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$	LS/CO5	6

DY. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
Regular/Supplementary Winter Examination – 2024

Course: B. Tech.

Branch : Electronics & Telecommunication Engineering /Electronics and Communication Engineering

Subject Code & Name: ETETPE3042 Power Electronics

Semester : _____

Max.Marks: 60

Date: 11/02/2025

Duration: _____

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer is as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

					(Level/CO)	Marks
Q.1	Objective type questions. (Compulsory Question)					12
1	An SCR can be used					1
	a. as static conductor	b. for power control	c. for speed control of dc shunt motor	d. all of these		
2	TRIAC is a semiconductor power electronic device which contains					1
	a. Two SCR's connected in reverse parallel	b. Two SCR's connected in parallel	c. Two SCR's connected in series	d. Two SCR's connected in series		
3	The body of an IGBT consists of a					1
	a. p-layer	b. n-layer	c. p-n layer	d. metal		
4	Which one of the following device is uncontrolled?					1
	a. SCR	b. MOSFET	c. Diode	d. TRIAC		
5	The UJT operates in what region after peak point?					1
	a. Cut off	b. Negative resistance	c. Saturation	d. Positive resistance		
6	The switching function of semiconductor devices can be characterized with					1
	a. Duty ratio only	b. Frequency only	c. Duty ratio and frequency	d. Duty ratio, frequency and turn delay		
7	In a full wave rectifier, the rectification ratio is approximately equal to					1
	a. 81%	b. 71%	c. 81%	d. 91%		
8	SPMS are based on the principle					1
	a. Phase control	b. Integral control	c. Chopper	d. MOSFET		
9	What is used in the rotating type UPS system to supply the mains.					1

Page 1

Q.1	a. DC motor	b. Self excited DC generator	c. Alternator	d. Battery bank
10	Which terminal does not belong to the SCR?			
	a. Anode	b. Gate	c. Base	d. Cathode
11	The value of anode current required to maintain the conduction of an SCR even though the gate signal is removed is called as the			
	a. holding current	b. latching current	c. sustaining current	d. peak anode current
	Inverters converts			
	a. dc power to dc power	b. dc power to ac power	c. ac power to ac power	d. ac power to dc power
Q.2	Solve the following.			
A)	What are different triggering circuits for thyristor.			
B)	Explain concept of fast recovery and schottky diodes.			
Q.3	Solve the following.			
A)	Explain semi bridge converters for R and RL load.			
B)	Explain full bridge converters for RL and RLE load.			
Q.4	Solve Any Two of the following.			
A)	Explain control techniques for choppers. VTC and CLC.			
B)	Give circuit diagram, waveforms and detailed analysis of Step up chopper.			
C)	Explain Type B chopper.			
Q.5	Solve Any Two of the following.			
A)	Explain PWM Inverters.			
B)	Explain single phase current source inverter.			
C)	Explain principle of operation of full bridge square wave inverter.			
Q.6	Solve Any Two of the following.			
A)	Explain UPS with block diagram and comparison.			
B)	Explain block schematic of SPS.			
C)	Explain P M Stepping Motor Drive with circuit diagram and waveforms.			

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LUNER

Regular/Supplementary Winter Examination – 2024

Course: R.TECH

Branch: Electrical Engineering and Allied

Semester: V

Subject Code & Name: RTEECS01 Power System Analysis

Max Marks: 60

Date: 06/02/2025

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and includes objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question expected answers as per COs in the Course Outcome (CO) in which question is based is mentioned in (1) in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Examine carefully data & assumptions given in Question 2, clearly.

		CO	Marks
Q.1	Objective type questions. (Compulsory Question)		12
1	The load flow solution is always assured in case of) (a) Newton-Raphson method (b) Gauss method (c) Gauss-Seidel method (d) None of these	CO1	1
2	The p.u. impedance value of an alternator corresponding to base values 11.2 kV and 20 MVA is 0.2 p.u. The p.u. value for the base values 13.8 kV and 30 MVA will be: (a) 0.306 p.u. (b) 0.33 p.u. (c) 0.318 p.u. (d) 0.328 p.u.	CO1	1
3	The positive, negative and zero sequence impedances of a solidly grounded system under steady state condition always follow the relation: (a) $Z_1 = Z_2 = Z_0$ (b) $Z_0 = Z_1 = Z_2$ (c) $Z_1 = Z_2 = Z_0$ (d) None of the above	CO1	1
4	The per unit impedance of a circuit element is 0.15. If the base kV and base MVA are halved, then the new value of the per unit impedance of the circuit element will be: (a) 0.075 (b) 0.15 (c) 0.30 (d) 0.600	CO2	1
5	A single line to ground fault occurs on an unloaded generator in phase a. If $x_d = x_2 = 0.15$ p.u., $x_0 = 0.15$ p.u., reactance connected in the neutral, $x_n = 1.85$ p.u. and the initial prefault voltage is 1.0 p.u., then the magnitude of the fault current will be: (a) 3.33 p.u. (b) 1.34 p.u. (c) 1.43 p.u. (d) 1.25 p.u.	CO2	1
6	Possible faults that may occur on a transmission line are: (a) 3 ph Fault (b) L-L Fault (c) L-G fault (d) L-L Fault	CO2	1

7	A transformer rated for 500 KVA 11 KV/0.4 KV has an impedance of 10% and is connected to an infinite bus. The fault level of the transformer is				CO2
	a) 500 KVA	b) 5000 KVA	c) $500/\sqrt{3}$ KVA	d) 50 KVA	
8	The positive sequence component of voltage at the point of fault is zero when it is a				CO3
	a) 3 ph Fault	b) LLG Fault	c) LG fault	d) LL Fault	
9	Zero sequence currents can flow from a line into a transformer bank if the windings are in				CO4
	a) grounded wye/delta	b) delta/star	c) star/grounded star	d) delta/delta	
10	Tick out the correct statement: (a) The negative and zero sequence voltages are maximum at the fault point and decrease towards the neutral (b) The negative and zero sequence voltages are minimum at the fault point and increase towards the neutral (c) The negative sequence is maximum and zero sequence minimum at the fault point and decrease and increase respectively towards the neutral. (d) None of the above.				CO4
11	The bus admittance matrix (Ybus) of a power system is not				CO5
	(a) symmetric	(b) a square matrix	(c) full matrix	d) dominant diagonal elements	
12	The bus admittance matrix of a power system is given as $\begin{matrix} & \begin{matrix} 1 & 2 & 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} -j50 & +j10 & +j5 \\ +j10 & -j20 & +j10 \\ +j5 & +j10 & -j20 \end{bmatrix} \end{matrix}$ The impedance of line between bus 2 and 3 will be equal to (a) $+j0.1$ (b) $-j0.1$ (c) $+j0.2$ (d) $-j0.2$				CO5
Q.1	Solve the following				
A	Define the term per unit voltage, per unit impedance and per unit voltamperes? What are the advantages of per unit representation.				CO1
B	Draw per unit resistance diagram for three phase system shown in fig. choose 20 MVA and 66 KV as base value.				CO1



Q.2 Solve the following

A) Classify various types of buses in a power system for load flow studies. Justify the classification.

CO2

12

B) Determine admittance matrix it is given that all the line are characterized by series impedance $0.1 + j0.7 \text{ ohm/km}$ and shunt admittance of $j0.35 \times 10^{-5} \text{ mho/km}$.

CO2

6



Q.4 Solve Any Two of the following.

CO3

12

A) Compare the performance of Gauss-Seidel method and Newton-Raphson method for load flow solution.

CO3

6

B) Explain sudden short circuit at the receiving terminal of three phase generator at no load condition.

CO3

6

Write short note on Contingency Analysis.

CO3

6

Q.3 Solve Any Two of the following.

CO4

6

A) Define α - operator & draw the phasor representation of all sequence component with respective original system. and determine original phasors in terms of sequence component.

CO4

6

B) A set of unbalanced line current in three phase, four wire system is as follows: $I_a = -j6 \text{ A}$, $I_b = (-8 + j5) \text{ A}$, $I_c = 7 \text{ A}$

CO4

6

	Determine zero, positive, negative sequence component of the current.		
c)	Determine phase voltage V_u, V_b and V_c from three phase unbalanced voltage in to symmetrical component gave the following result: $V_{a0} = 30\angle -30^\circ, V_{a1} = 450\angle 0^\circ$ and $V_{a2} = 225\angle 40^\circ$	CO4	8
	Solve Any Two of the following.		
	Derive the expression for fault current in case of L.L. fault considering the sequence network under this type of fault with suitable diagram.	CO5	6
	The star point of a 3 kV, 3 MVA three-phase synchronous generator is solidly grounded. Its positive-, negative- and zero-sequence reactances are 2.4 ohm, 0.45 ohm and 0.30 ohm respectively. The generator, operating unloaded, sustains a resistive fault between the a phase and ground. This fault has a resistance of 1.2 ohm. Calculate the fault current and the voltage to ground of a phase.	CO5	8
	What are Power quality causes and explain it?	CO5	4
*** ***			

Course: B.Tech.

Semester: V

Branch: Electrical and Power/Electrical & Electronics Engineering/Electrical Engineering

Subject Code & Name: Microprocessor and Microcontroller (BTETCS02)

Max Marks: 60

Date: 08/02/2025

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question Nos. 2 to Question No. 5.
4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)	CO 01-05	12
1	Which of the following flag is used to mask DTR interrupt?		-
	a. zero flag b. auxiliary carry flag c. interrupt flag d. sign flag		
2	Which of the following flag condition is used for BCD arithmetic operations in microprocessor?		-
	a. Sign flag b. Auxiliary carry flag c. Parity flag d. Zero flag		
3	Which of the following is the correct sequence of operations in a microprocessor?		-
	a. Opcode fetch, memory read, memory write, IO read, IO write b. Opcode fetch, memory write, memory read, IO read, IO write c. IO read, opcode fetch, memory read, memory write, IO write d. IO read, opcode fetch, memory write, memory read, IO write		
4	Which process is used to map logical addresses of variable length onto physical memory?		-
	a. Paging b. Overlays c. Segmentation d. Paging with segmentation		
5	RAM is _____ and _____.		-
	a. Volatile, temporary b. Non-volatile, temporary c. Volatile, permanent d. Non-volatile, permanent		
6	Which is of the following is true about SPIC instruction?		-
	a. It uses indexed addressing mode b. It is a 3-byte instruction c. It requires three T-states d. Contents of HL pair is moved to SP		
7	8081 series has how many 16 bit registers?		-
	a. 2 b. 3 c. 4 d. 8		

8	If more than one channel requests service simultaneously, the master will master it			
	a. Multi master	b. Slave/master transfer	c. Slave master	d. None of the mentioned
	The bus is available when the DMA controller receives the signal			
	a. HRQ	b. HRAS	c. CASK	d. All of the mentioned
9	The 8255 is a _____ chip			
	a. Input Output	b. Analog-to-Digital	c. Digital-to-analog	d. None of the mentioned
	How many rows and columns are present in 8255 approximately I/O?			
	a. rows=2, columns=12	b. rows=18, columns=2	c. rows=18, columns=18	d. rows=2, columns=18
10	How are the status of the carry, auxiliary carry and parity flag affected if the instruction MOV A, 90H ADD A, 64H			
	a. CY=0, AC=1, PF=0	b. CY=1, AC=1, PF=0	c. CY=0, AC=1, PF=1	d. CY=1, AC=1, PF=1
Q. 1	Solve the following.			
A1	What is an interrupt? Explain a different type of interrupt occurs in 8085.			
	Draw architecture diagram of 8085 microprocessor. Explain any two block.			
Q. 2	Solve the following.			
A2	Discuss different types of data transfer technique in 8085. Explain synchronous and Asynchronous modes in 8085 microcontroller.			
	B) Explain 1. Memory mapped I/O schemes 2. I/O mapped I/O schemes			
Q. 3	Solve Any Two of the following.			
A3	Write short note on Register Mode.			
	B) Explain DMA Controller.			
	C) Explain traffic light controller in detail.			
Q. 4	Solve Any Two of the following.			
A4	Write short note on memory organization of 8085.			
	B) Explain following instruction of 8085. 1. MOV A, R1 2. ADD A, R2 3. ORG 0H			
	C) Explain TCON & TMOD register in 8051 microcontroller.			

Q. 6	Solve Any Two of the following.	CO-5	2
A)	Write an assembly language program of 8085 for adding ten numbers in an array. Assume suitable data.		•
B)	Draw interfacing diagram of 8k*8 program ROM with 8085 and also write memory map for same.		•
C)	Explain RS 232 and RS 485.		•
...	...		

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Course: B.Tech

Branch: Electrical and Power/Electrical & Electronics

Engineering/Electrical Engineering

Code & Name: BTEEC503 & Power Electronics

Semester: V

Max Marks: 60

Date: 11/02/2025

Duration: 1 Hr.

Instructions to the Students:

1. Each question carries 12 marks.

2. Question No. 1 will be compulsory and include objective-type questions.

3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.

4. The level of questions expected answer as per LME or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.

5. Use of non-programmable scientific calculators is allowed.

6. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q.1 Objective type questions. (Compulsory Question)

12

1. The terminal characteristics of power electronics devices like SCR and MOSFET refer to:

CO1

1

- a. The power consumption of the device
b. The voltage and current relationships at the device terminals
c. The thermal properties of the device
d. The mounting specification

2. Which of the following is primarily used for protection in power electronics circuits?

CO4

1

- a. Firing circuits
b. Snubber circuits
c. Cooling systems
d. Mounting systems

3. Which of the following statements is most accurate regarding the gate turn-off (GTO) thyristor in comparison to the standard SCR?

CO1

1

- a. GTO can be turned off by applying a negative gate current, whereas SCR requires the current to drop to zero for
b. GTO has a slower switching speed than SCR, making it less suitable for high-frequency applications
c. SCR has superior thermal performance, whereas GTO suffers from significant thermal runaway issues
d. GTO is typically used in applications with very low voltage requirements due to its high turn-on voltage

- turning off.
4. The DC output voltage in phase-controlled rectifiers depends on: CO1
- Only the frequency of the AC supply
 - The firing angle
 - The inductance of the load
 - The size of the transformer
- Which of the following is a major application of choppers? CO3
- AC motor drives
 - DC motor drives
 - AC voltage regulation
 - Frequency synthesis
- The harmonic reduction in the inverter output voltage can be achieved by CO3
- Using filters
 - Increasing the modulation frequency
 - Using PWM techniques
 - All of the above
7. AC voltage controllers are primarily used to: CO4
- Control the DC output voltage
 - Regulate the AC input voltage to an appropriate level
 - Convert AC to DC
 - Improve the efficiency of inverters
- In a DC-DC buck converter, if the input voltage is 24V and the duty cycle is 40%, what will be the output voltage? CO3
- 9.6V
 - 11V
 - 16.4V
 - 7.6V
9. In a single-phase controlled rectifier with an RL load, the AC supply voltage is 230V RMS. If the firing angle is 90° , calculate the average DC voltage across the load. CO2
- 110V
 - 120V
 - 130V
 - 100V
- What is the main function of a cycloconverter? CO4
- Convert AC to DC
 - Convert DC to AC
 - Convert AC to AC with variable frequency
 - Convert AC to DC with variable frequency
- Which harmonic component is primarily targeted by a well-designed filter in an inverter system? CO3
- DC component
 - Fundamental frequency
 - Odd harmonics
 - Even harmonics
12. The inverters are primarily used for CO3

a. AC to AC
conversion

b. DC to DC
conversion

c. DC to AC
conversion

d. AC to DC
conversion

Q.3 Solve the following.

a) Describe the forward characteristics of following power electronic devices

SCR

BJT

MOSFET

What is TRIAC? Explain turning on process and V-I characteristics of TRIAC.

CO1

12

•

CO1

•

Q.4 Solve the following.

a) Explain with a neat circuit diagram working of single phase half wave controlled rectifier for R load. Draw necessary waveforms.

Derive an expression for output voltage (V_o), output current (I_o).

b) A single phase controlled rectifier bridge consists of one SCR and three diodes as shown in the figure below.

ii) Sketch output voltage waveform for a firing angle α for the SCR and hence obtain an expression for the average output voltage under the assumption of continuous current. State the conduction of various components as well.

iii) For an AC source voltage 230V, 50Hz and firing angle of 45° , find average output voltage and, find average output current in case load consist of $R=5\Omega$, $L=8mH$ and $E=100V$.

CO2

12

•

CO2

•



Fig. circuit diagram of controlled rectifier

Q.4 Solve Any Two of the following.

a) Discuss the different current strategies used in chopper circuits for regulating the output voltage. Compare time ratio control and current

CO3

12

•

- Initial control strategy of chopper.
- B) Illustrate with a neat circuit diagram working of a four quadrant or type E chopper.
- C) For Type A chopper as shown in figure, DC source voltage = 230V, load resistance = 10Ω. Take voltage drop of I.V across chopper when it is on. For a duty cycle of 0.8 calculate:
 a) average and rms value of output voltage
 b) chopper efficiency.

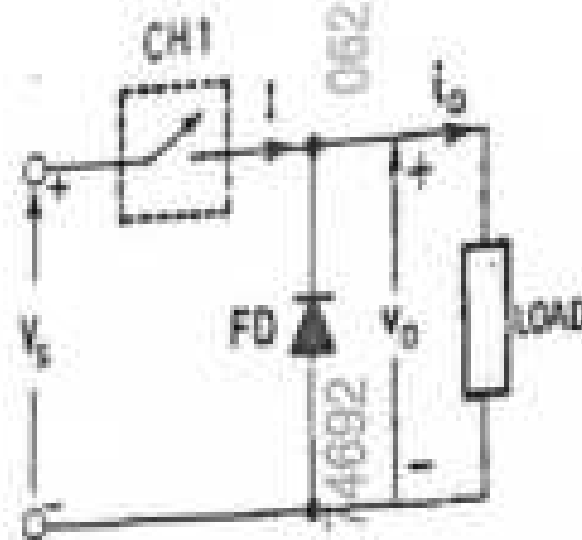


Fig. Circuit diagram of Type A Chopper

Q.5 Solve Any Two of the following.

- A) With a neat circuit diagram explain working of a single-phase full bridge inverter for R load. Draw necessary waveforms.
- B) Define the term harmonics? What are the methods for harmonic reduction in inverter output voltage. Illustrate any one method in detail.
- C) What is PWM technique? Mention different types of PWM technique. Elaborate in detail SPWM technique.

Q.6 Solve Any Two of the following.

- A) Elaborate working of single-phase full-wave AC voltage controller with the help of power circuit diagram. Draw necessary waveforms.

ii) A single-phase half-wave AC voltage controller feeds a load of $R=20\Omega$ with an input voltage of 230V, 50Hz. Firing angle of thyristor is 45° . Determine,

CO4

6

a) rms value of output voltage

b) Power delivered to load

What is cycloconverter? Explain step-down cycloconverter with a neat circuit diagram. Draw necessary waveform.

CO4

6

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Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and includes objective type questions.
3. Candidates are required to attempt only five questions from Question No. 2 to Question No. 6.
4. The level of questions/expected answer index (LOE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Q.1 Objective type questions. (Compulsory Question)

1. Which of the following is NOT a register in the 8085 microprocessor?
 A) Accumulator B) Program Counter C) Stack Pointer D) Index Register
 (Level/CO) (1/1)
2. Which of the following is NOT an addressing mode in 8085?
 A) Direct addressing B) Indirect addressing C) Immediate addressing D) Register addressing
 (Level/CO) (1/1)
3. In 8085 microprocessor, memory interfacing is performed using
 A) I/O ports B) Control signals only C) Address bus D) Data bus
 (Level/CO) (1/1)
4. In interfacing 8255 with 8085, which of the following is required?
 A) Only data bus B) Only address bus C) Both data bus and address bus D) Interrupt signals
 (Level/CO) (1/1)
5. Which of the following is NOT a type of interrupt in the 8085 microprocessor?
 A) RST7.5 B) TRAP C) INTR D) RST6.5
 (Level/CO) (1/1)
6. The 8257 IC is used for:
 A) Serial communication B) Interrupt handling C) Direct Memory Access D) Data transfer via I/O ports
 (Level/CO) (1/1)
7. The ADC (8001/8008/8025) is used for interfacing:
 A) Analog to digital conversion B) Digital to analog conversion C) Data transfer D) Memory interfacing
 (Level/CO) (1/1)
8. The 8051 has how many interrupt sources?
 A) 2 B) 3 C) 4 D) 6
 (Level/CO) (1/1)
9. The 8051 microcontroller's parallel ports can be configured for which of the following modes?
 A) Input, Output, and Bidirectional B) Only input C) Only Output D) Input and interrupt modes
 (Level/CO) (1/1)
10. Which of the following is a special-purpose register of microprocessor?
 (Level/CO) (1/1)

	A) Program Counter	B) Instruction register	C) Accumulator	D) Temporary register		
11.	Which of the following is a non-vectored input?				12	1
	a) TRAP	b) RST-7.5	c) RST-4.5	d) INTA		
12.	Which of the following is NOT a type of main memory?				12	1
	a) RAM	b) ROM	c) Cache	d) EPROM		

Q.2 Solve the following.

- Draw pin configuration of Microprocessor 8085 and explain function of each pin.
Define addressing modes of 8085 and explain each mode with suitable examples.

Solve the following.

Explain the following instructions with suitable example.

- i) LRI H, 2050H
ii) LDAX B
iii) INR H
- b) Write an ALP for 8085 to find the larger of two numbers stored in memory locations 2101 H and 2102 H. Store the result in memory location 2103 H.

Solve Any Two of the following.

- What is DMA? Draw and explain pin configuration of DMA IC 8237 in details.
What is meant by an interrupt? Explain a different type of interrupt occurs in 8085?
Discuss different types of Data transfer techniques in 8085. Explain Synchronous and Asynchronous Data Transfer Method.

Solve Any Two of the following.

- A) Describe the successive approximation method for A/D conversion.
B) Write an assembly language program to generate square waveform on CH0 using an interfacing IC 8255 with μ P 8085.
C) Distinguish between memory mapped I/O and I/O mapped I/O schemes.

Solve Any Two of the following.

- Explain the On-chip memory organization of an 8051 microcontroller.
What are the functions of the PSW Register in the 8051 microcontroller? List the individual flags and describe each.
C) Describe the function of TCON, TMOD, IP, and IE registers in the 8051.

*** End ***

Instructions to the Students:

Each question carries 12 marks.

Question No. 1 will be compulsory and include objective-type questions.

Candidates are required to attempt any five questions from Question No. 2 to Question No.

The level of question/expected answer (L1 or L2) or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.

Use of non-programmable scientific calculator is allowed.

Assume suitable data whenever necessary and mention it clearly.

Q.1 Objective type questions. (Compulsory Questions)

1. Which of the following is NOT a register in the 8085 microprocessor?

- A) Accumulator B) Program Counter C) Stack Pointer D) Index Register

L1

12

2. Which of the following is NOT an addressing mode in 8085?

- A) Direct addressing B) Indirect addressing C) Indexed addressing D) Immediate addressing

L1

4

In 8085 microprocessor, memory interfacing is performed using:

- A) I/O ports B) Control signals only C) Interrupts D) Address bus

L1

4

In interfacing 8255 with 8085, which of the following is required?

- A) Only data bus B) Only address bus C) Both data bus and address bus D) Interrupt signals

L1

4

3. Which of the following is NOT a type of interrupt in the 8085 microprocessor?

- A) RST7.5 B) TRAP C) INTA D) RST6.5

L1

4

4. The 8257 IC is used for:

- A) Serial communication B) Interrupt handling C) Direct Memory Access D) Data transfer via I/O ports

L1

4

The ADC 0800/0804/0805 is used for interfacing:

- A) Analog to digital conversion B) Digital to analog conversion C) Data transfer D) Memory interfacing

L1

4

The 8251 has how many interrupt sources?

- A) 2 B) 3 C) 4 D) 5

L1

4

The 8051 microcontroller's parallel ports can be configured for which of the following modes?

- A) Input, Output, and Bidirectional B) Only Input C) Only Output D) Input and interrupt modes

L1

4

5. Which of the following is a special-purpose register of microprocessor?

L1

4

	A) Program counter	B) Instruction register	C) Accumulator	D) Temporary register		
11	Which of the following is a non-machined input?				13	1
	A) TRAP	B) RST-7.5	C) RST-6.5	D) INTR		
12	Which of the following is NOT a type of main memory?				13	1
	A) ROM	B) RAM	C) Cache	D) EPROM		
Q.3	Solve the following.				14	
	Draw pin configuration of Microprocessor 8085 and explain function of each pin.				CO1	1
	Define addressing modes of 8085 and explain each mode with suitable examples.				CO1	1
	Solve the following.					14
	Explain the following instructions with suitable example.				CO2	1
	i) LXI H, 2050H					
	ii) LDAX B					
	iii) INX H					
B)	Write an ALP for 8085 to find the larger of two numbers stored in memory locations 2301 H and 2302 H. Store the result in memory location 2303 H.				CO2	1
Q.4	Solve Any Two of the following.					14
	What is DMA? Draw and explain pin configuration of DMA IC 8257 in details.				CO3	1
	What is meant by an interrupt? Explain a different type of interrupt occurs in 8085?				CO3	1
	Discuss different types of Data transfer techniques in 8085. Explain Synchronous and Asynchronous Data Transfer Method.				CO3	1
Q.5	Solve Any Two of the following.					14
A)	Describe the successive approximation method for A/D conversion.				CO4	1
B)	Write an assembly language program to generate square waveform on CRO using an interfacing IC 8255 with up 8085.				CO4	1
	Distinguish between memory mapped I/O and I/O mapped I/O scheme.				CO4	1
Q.6	Solve Any Two of the following.					14
	Explain the on-chip memory organization of an 8051 microcontroller.				CO5	1
	What are the functions of the PSW Register in the 8051 microcontroller? List the individual flags and describe each.				CO5	1
C)	Describe the function of TCON, TMOD, IP, and IE registers in the 8051.				CO5	1

*** End ***

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The size of questions/expected answer at per COs of the Course Outcome (CO) in which the question is asked mentioned in () in form of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

1. Objective type questions. (Compulsory Question)

12

1. What is the primary function of a firing angle in an HVDC converter?

1

- a) Control the magnitude of the DC voltage
b) Measure reactive power
c) Determine the load flow direction
d) Reduce harmonics in the system

2. Which type of MTDC system connects multiple terminals using a common DC bus?

1

- a) Parallel MTDC
b) Series MTDC
c) Hybrid MTDC
d) Bipolar MTDC

3. What is the function of a bridge converter in HVDC systems?

1

- a) Convert AC to DC and vice versa
b) Reduce harmonic generation
c) Provide reactive power compensation
d) Control power flow in AC systems

4. Which parameter determines the point at which power flow reversal occurs in HVDC systems?

1

- a) Extinction angle
b) Firing angle
c) Commutation time
d) Fault current

5. What is the primary cause of commutation failure in HVDC systems?

1

- a) High inductance
b) Insufficient AC voltage
c) Excessive DC current
d) Over-voltage in the system

6. Which device is used in HVDC systems to limit fault currents during a short circuit?

1

- a) DC reactor
b) AC capacitor
c) Transformer
d) Harmonic filter

7. Which type of harmonics are generated due to non-ideal converter operation?

7. a) High-Frequency harmonics b) Characteristic harmonics c) Fundamental harmonics d) Uncharacteristic harmonics
8. What is the main purpose of harmonic filters in HVDC systems?
 a) To reduce losses b) To improve power factor c) To eliminate harmonics from the system d) To enhance voltage stability
9. Which of the following is an advantage of hybrid HVDC systems?
 a) Lower operational complexity b) Reduced harmonic generation c) Integration of offshore wind power d) Elimination of commutation failures
10. What does power flow analysis in an AC-DC system primarily determine?
 a) Stability of the AC grid b) Voltage levels in DC links c) Power transfer capability between AC and DC systems d) Fault tolerance of the DC system
11. Which analysis focuses on the response of an AC-DC system to sudden changes, such as faults?
 a) Steady-state analysis b) Dynamic stability analysis c) Harmonic analysis d) Transient stability analysis
12. How does HVDC transmission benefit wind power generation?
 a) By reducing transportation and power loss b) By eliminating voltage fluctuations in AC systems c) By enabling frequency synchronization d) By minimizing harmonic distortion

Q. 2 Solve the following.

- A) Explain the role and function of converter configurations in HVDC systems. How is the selection of a suitable converter configuration made?
- B) What is the significance of firing angle, current, and extinction angle control in the operation of HVDC systems?

Q.3 Solve the following.

- A) Describe the operation of a bridge converter in rectifier and inverter modes and explain the conditions for power reversal.
- B) What are the desired features of control in HVDC bridge converters, and how do they differ from actual control characteristics?

Q. 4 Solve Any Two of the following.

- A) What are commutation failures in HVDC converters, and what are their common causes?
- B) Explain the protective action taken by DC reactors and DC circuit breakers in HVDC systems.

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Q. Discuss the challenges of voltage and current oscillations in HVDC systems and how overvoltage protection is implemented.

CO3

6

Q.5 Solve Any Two of the following.

12

A) Differentiate between characteristic and uncharacteristic harmonics in HVDC systems and their respective causes.

CO1

6

B) What are the troubles caused by harmonics in HVDC transmission, and how can active and passive filters mitigate these issues?

CO2

6

C) Provide an overview of hybrid HVDC systems and their role in off-shore wind power evacuation schemes.

CO3

6

Q.6 Solve Any Two of the following.

12

A) How is power flow analysis conducted in an AC-DC system, and why is it essential in HVDC transmission?

CO1

6

B) Explain the methods used for transient and dynamic stability analysis in HVDC systems.

CO2

6

C) Discuss the advances in HVDC transmission technology and its applications in wind power generation.

CO3

6

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: B.Tech

Semester: V

Branch: Electrical and Power/Electrical & Electronics Engineering/Electrical Engineering

Subject Code & Name: Electrical Safety (ETEE0502)

Max Marks: 60

Date: 22/02/2025

Duration: 45

Instructions to the Students:

Each question carries 12 marks.

Question No. 1 will be compulsory and includes objective-type questions.

Candidates are required to attempt any 3 questions from Question No. 2 to Question No. 5.

4. The level of question/expected answer as per COs of the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.

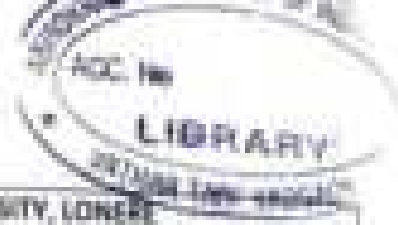
5. Use of non-programmable scientific calculator is allowed.

6. Assume suitable data whenever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
1	Electrical hazards include shock, electric arcs, blasts, and _____ of faulty equipment.	CO1	1
	a. Broken b. Double-insulated c. Pinned d. Secure		
2	_____ gives a leakage current somewhere to go and keeps workers away from becoming part of the circuit.	CO2	1
	a. De-energizing b. Energizing c. Grounding d. Guarding		
3	Specialty designed PPE for electrical work includes _____ insulating gloves, matting, blankets, and covers.	CO1	1
	a. Plastic b. Rubber c. Steel d. Wood		
4	The "Can't Let Go" range of current flow is typically between _____.	CO1	1
	a. 3-9 ma b. 9-25 ma c. 25-40 ma d. 1-3 ma		
5	Electrical injuries are commonly caused by _____ electric shock.	CO2	1
	a. Unsafe equipment b. An unsafe environment c. Unsafe work practices d. All of the above		
6	The effects of an electrical shock on the body depend upon all of the following except _____.	CO2	1
	a. Current b. Path c. Duration d. Body weight		

7	 burns occur when current flows along the skin or within the body.				CO3	-
	a. Fire	b. Electrical	c. Electrical or fire	d. None of the answers		
8	You should always turn off or remove all power making alterations to an electrical circuit.				CO2	062179141
	a. After	b. Before or after	c. Before	d. None of the answers		
9	 is a conducting object through which a direct connection to earth is established.				CO2	062179141
	a. Equipment bonding	b. Equipment grounding	c. Grounding electrode	d. Either A or C		
10	Both voltages and body resistances will reduce the degree of electrical shock or damage to the human body.				CO2	062179141
	a. Lower; higher	b. Higher; lower	c. Higher; higher	d. Lower; lower		
11	Which organization in India enforces electrical safety regulations?				CO1	062179141
	a. Bureau of Indian Standards (BIS)	b. Ministry of Power	c. Central Electricity Authority (CEA)	d. Occupational Safety and Health Administration (OSHA)		
12	Which regulation mandates the use of Personal Protective Equipment (PPE) for electrical work?				CO1	062179141
	a. OSHA 1910.132	b. NEC 504	c. NFPA 70B	d. IEC 61850		
13	Solve the following.					
14	List and explain in short safety equipment used in electrical work.				CO1	-
15	What are Causes of Electrical Hazards explain Primary and Secondary Hazards in Electrical work				CO3	-

Q.3	Solve the following.			
A1	Define Reliability-Centered Maintenance (RCM) and explain its significance in electrical maintenance.	CO3		
A2	Discuss the role of safety considerations in RCM-based electrical maintenance programs.	CO4		
A3	Solve Any Two of the following, which are general requirements of grounding and bonding.	CO1		
A4	Explain Six Step Safety Methods in Electrical Work.	CO2		
A5	What is the one-minute Electrical Safety Audit. Which are Safety Equipment and Procedures for Low, Medium, and High Voltage Systems.	CO3		
A6	Solve Any Two of the following.			
A7	Why is Safety Policy important in an Electrical Safety Program?	CO2		
A8	What are the essential first aid and rescue techniques in electrical safety?	CO3		
A9	Explain the significance of safety meetings and audits in accident prevention.	CO4		
Q.4	Solve Any Two of the following.			
A1	What is the National Electrical Safety Code (NESC), and why is it important?	CO2		
A2	What are the major provisions of the Indian Electricity Act related to electrical safety?	CO1		
A3	What are the key provisions of the Occupational Safety and Health Administration (OSHA) standards related to electrical safety?	CO3		



DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Page: 8, TION

Branch: Electrical and Power/Electrical & Electronics Engineering/Electrical Engineering

Semester: V

Subject Code & Name: Embedded System (RTEDCS05A)

Max. Marks: 60

Date: 22/02/2025

Duration: 1 hr

Instructions to the Students:

- Each question carries 12 marks.
- Question No. 1 will be compulsory and include objective-type questions.
- Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.
- The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
- Use of non-programmable scientific calculators is allowed.
- Assume suitable data wherever necessary and mention it clearly.

					Level/CO	Mark
Q.1	Objective type questions. (Compulsory Question)					12
1	Which of the following devices is typically used to convert an analog signal into a digital signal in embedded systems?					1
	a. DAC	b. ADC	c. Timer	d. I2C-bus		
2	Which of the following is used for communication between nodes in an RTOS?					1
	a. Semaphore	b. Time slicing	c. Context switching	d. File management		
3	In a System on Chip (SoC) architecture, which of the following is integrated into a single chip?					1
	a. Memory only	b. Processor, memory, and peripherals	c. Only the processor	d. Only the bus interface		
4	Which of the following is a key characteristic of an RTOS?					1
	a. It is used for task scheduling based on priority and	b. It is only used in large-scale computer systems	c. It does not support interrupt handling	d. It can only run a single task at a time		

	deadlines			
7	Which communication protocol is most suitable for low-speed, short-distance communication in embedded systems?			
	a. I2C	b. CAN Bus	c. Ethernet	d. Internet
	In a distributed embedded system, which of the following network topologies is commonly used to interconnect various components?			
	a. Star topology	b. Ring topology	c. Mesh topology	d. Bus topology
	When designing an embedded system for a PBX system, what is the most important aspect to focus on?			
	a. High data storage	b. Real-time processing and communication	c. High-definition video output	d. Wireless connectivity
	Which state is a task in when it is waiting for an event or a condition to be met in an RTOS?			
	a. Ready	b. Running	c. Blocked	d. Suspended
	Which of the following is a common service provided by the kernel in an RTOS?			
	a. Task management	b. Data encryption	c. File system management	d. Graphics rendering
10	In embedded network design, which protocol is used for interconnecting various devices in a networked environment?			
	a. TCP/IP	b. CAN	c. I2C	d. SPI
	What is CRC used for in embedded systems?			
	a. To test memory functionality	b. To store data securely	c. To ensure data integrity	d. To increase processing speed
12	Which of the following networks is most commonly used in industrial embedded systems?			
	a. Wi-Fi	b. Ethernet	c. CAN Bus	d. Bluetooth

2.2	Solve the following.		12
a)	Explain the key components of an embedded system and their roles in system design.		6
b)	Discuss the concept of System-on-Chip (SoC) and the importance of scalable bus architectures in embedded designs.		6
2.3	Solve the following.		12
a)	Describe the function of relays in embedded systems and how they can be controlled using port write commands.		6
b)	Explain the working principle of ADC (Analog-to-Digital Converter) and DAC (Digital-to-Analog Converter) in embedded systems.		6
2.4	Solve Any Two of the following.		12
a)	Explain the concept of a real-time kernel and its role in embedded systems.		6
b)	Explain the importance of communication and synchronization in RTOS, and describe methods like semaphores and message queues.		6
c)	What are the key methods of task scheduling in an RTOS? Compare preemptive and cooperative scheduling.		6
2.5	Solve Any Two of the following.		12
a)	Describe the key features of I2C and CAN bus protocols used in embedded systems communication. What are their advantages and limitations?		6
b)	Explain the hardware and software architectures used in distributed embedded systems.		6
c)	Outline the design of an elevator controller as a distributed embedded system, highlighting hardware platform design, allocation, and scheduling.		6
2.6	Solve Any Two of the following.		12
a)	Discuss different types of RAM and ROM used in embedded systems, and explain the significance of memory testing and CRC.		6
b)	Explain the specification, requirements, and architectural design of a PBX system in embedded systems.		6
c)	Compare the architectural design of ink-jet printers and laser printers, focusing on processor family, memory, and I/O mapping.		6

*** End ***