CBCS SCHEME

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21CS51

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Automata Theory and Compiler Design

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define DFA. Construct DFA for the following languages:
i) L = {W : W is of even length and begin with 01}
ii) Accepts all strings on $\Sigma = \{0, 1\}$ except those containing the substring 001 **(08 Marks)**

b. Discuss the various phases of compiler with suitable example. **(06 Marks)**

c. Convert the following NFA into DFA

	0	1
→p	{p, q}	{p}
q	{r}	{r}
r	{s}	φ
*s	{s}	{s}

(06 Marks)

OR

2 a. Draw the table of distinguishabilities for the below DFA. Construct the minimum state equivalent DFA.

	0	1
→A	B	E
B	C	F
*C	D	H
D	E	H
E	F	I
* F	G	B
G	H	B
H	I	C
*I	A	E

(08 Marks)

b. Define ∈-closure of any state. Convert the following ∈-NFA into DFA.

	∈	a	b	c
→p	{q, r}	φ	{q}	{r}
q	φ	{p}	{r}	{p, q}
*r	φ	φ	φ	φ

(06 Marks)

c. Define the terms:
i) Alphabet
ii) String
iii) Language
iv) Empty string
v) Concatenation of strings
vi) Powers of an alphabet **(06 Marks)**

Module-2

3 a. Define regular expression. Write regular expression for the following:
i) Strings in which third symbol from the right end is 'b' on $\Sigma = \{a, b\}$
ii) $L = \{a^n b^m : n \geq 4 \text{ and } m \leq 3\}$
iii) $L = \{a^n b^m : n \geq 1, m \geq 1, nm \geq 3\}$ **(10 Marks)**

b. Show that the language consists of strings of a's and b's in which number of a's is less than number of b's is not regular. **(06 Marks)**

c. Discuss input buffering and sentinels. **(04 Marks)**

OR

4 a. Show that every language defined by a regular expression is also defined by a finite automata construct. $\in$-NFA for the regular expression $r = a^* + b^* + c^*$ **(10 Marks)**

b. Discuss lexemes, patterns and tokens with example. **(06 Marks)**

c. What is transition diagram? Write the transition diagram for unsigned number. **(04 Marks)**

Module-3

5 a. Define CFG. Write CFG for the following languages:
i) $L = \{0^i 1^j 0^k : j > i + k\}$
ii) $L = \{a^n b^m c^{n+m} : n, m \geq 0\}$ **(10 Marks)**

b. Write an algorithm to eliminate left recursion from the grammar. Apply the algorithm to the grammar
$S \to Aa/b$
$A \to Ac/Sd/\in$ **(06 Marks)**

c. Show that the grammar is ambiguous $S \to aS/X \quad X \to aX/a$ **(04 Marks)**

OR

6 a. Define leftmost, rightmost derivation and Parce tree. Find leftmost and rightmost derivation and construct parse tree for the string "aaabbabbba" using the grammar,
$S \to aB/bA \quad A \to a/aS/bAA \quad B \to b/bS/aBB$ **(10 Marks)**

b. Discuss the rules to compute FIRST (X) and FOLLOW (A). Construct predictive parsing table for the grammar,
$S \to iEtSS^1/a \quad S^1 \to eS/\in \quad E \to b$ **(10 Marks)**

Module-4

7 a. Construct canonical parsing table for the following grammar by constructing the collection of LR(1) items.
$S^1 \to S \quad S \to CC \quad C \to cC/d$ **(10 Marks)**

b. Construct LALR parsing table for the grammar
$S^1 \to S \quad S \to CC \quad C \to cC/d$ **(10 Marks)**

OR

8 a. Write canonical collection of sets of LR(0) items. Illustrate the actions of a shift-reduce parser on input id $*$ id
$E \rightarrow E + T / T \quad T \rightarrow T * F/F \quad F \rightarrow (E) / id$ **(10 Marks)**

b. Define NPDA. Construct NPDA for the language $L = \{WCW^R : W \in \{a,b\}^*\}$. Show the sequence of moves in accepting the string abcba **(10 Marks)**

Module-5

9 a. What are syntax directed definitions? Give SDD of a simple desk calculator. **(06 Marks)**

b. Discuss three address code with an example. **(06 Marks)**

c. Write a note on:
i) Multitape Turing Machine
ii) Recursive Language **(08 Marks)**

OR

10 a. Differentiate between S-attributed and L-attributed definitions. **(04 Marks)**

b. Discuss any three issues in the design of a code generator. **(06 Marks)**

c. Define Turing Machine. Construct Turing Machine for the language $L = \{a^n b^n c^n : n \geq 0\}$ **(10 Marks)**

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CBCS SCHEME

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21CS52

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Computer Networks

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List and explain the six service primitives that provide a simple connection-oriented service using a simple client-server interaction. **(10 Marks)**

b. Illustrate the concept of total internal reflection in an optical fiber and explain the structure of fiber cables. **(10 Marks)**

OR

2 a. Explain the operation of seven layers of an OSI reference model using diagram. **(10 Marks)**

b. Explain the electromagnetic spectrum and its uses for communication with respect to wireless transmission. **(10 Marks)**

Module-2

3 a. List the different Error-Correcting codes and Hamming code correction using suitable example. **(10 Marks)**

b. Explain Cyclic Redundancy Check (CRC) using an example. **(10 Marks)**

OR

4 a. List and explain the assumptions for Dynamic Channel Allocation. **(10 Marks)**

b. Explain Carrier Sense Multiple Access (CSMA) with Collision Detection (CD) – CSMA/CD using suitable figure. **(10 Marks)**

Module-3

5 a. Illustrate shortest path algorithm for the given network from A to D. **(08 Marks)**

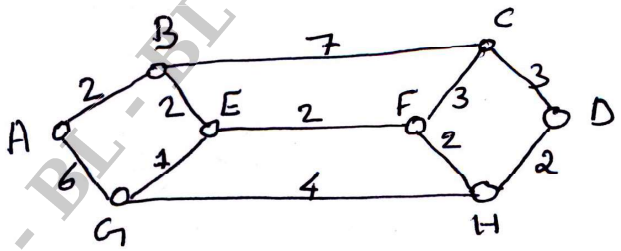

Fig.Q.5(b) Network diagram

b. Explain Distance Vector Routing using an example. Illustrate count-to-infinity problem. **(12 Marks)**

OR

6	a.	List and explain the different approaches used for congestion control.	**(10 Marks)**
	b.	Define Traffic shaping and explain Leaky and Token Buckets using diagram.	**(10 Marks)**

Module-4

7	a.	Explain the steps involved in making a remote procedure call using diagram.	**(08 Marks)**
	b.	Explain Real-Time transport protocols and packet nesting with respect to RTP.	**(12 Marks)**

OR

8	a.	Explain TCP header using diagram.	**(10 Marks)**
	b.	Illustrate TCP sliding window protocol using flow diagram.	**(10 Marks)**

Module-5

9	a.	Explain the fields of HTTP request and response message formats using diagram.	**(12 Marks)**
	b.	Illustrate web Caching using suitable diagram.	**(08 Marks)**

OR

10	a.	Illustrate the process of file transfer in an FTP protocol between local and remote file systems.	**(10 Marks)**
	b.	Illustrate the basic operations of SMTP to transfer a simple ASCII message using suitable diagram.	**(10 Marks)**

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CBCS SCHEME

BCS508

USN | | | | | | | | | |

Question Paper Version : A

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Environmental Studies and E – Waste Management

Time: 1 hr. Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
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---

1. Which of the following conceptual spheres of the environment is having the least storage capacity of matter?
a) Atmosphere b) Lithosphere c) Hydrosphere d) Biosphere

2. In an eco-system, the flow of energy is
a) Bidirectional b) Cyclic c) Unidirectional d) Multi Directional

3. Which of the following is not a prominent Chemical responsible for a good habitat?
a) Oxygen b) Carbondioxide c) SO_2 d) Nutrients

4. In complex eco-systems, the degree of species Diversity is
a) Poor b) Medium c) High d) None of these

5. World Environment day is on
a) 5^{th} May b) 5^{th} June c) 18^{th} July d) 14^{th} August

6. Abiotic component includes
a) Soil b) Temperature c) Water d) All of these

7. The sequence of eating and being eaten in an ecosystem is
a) Food chain b) Carbon cycle c) Water cycle d) Anthropoco system

8. The organisms which directly feed on producer called
a) Herbivores b) Carnivores c) Ominivores d) Decomposer

9. In an eco-system biological cycling of materials is maintains by
a) Producer b) Consumer c) Decomposer d) All of these

10. Which pyramid is always upright
a) Energy b) Biomass c) Numbers d) Food chain

11. Blue baby syndrome is caused by contamination of water due to
a) Phosphates b) Sulphur c) Arsenic d) Nitrates

12. Major source of Flouride is
a) River water b) Ground water c) Food products d) Tooth paste

13. Out of the following Nutrients in Fertilizer which one causes minimum water pollution
a) Nitrogen b) Phosphorous c) Pottasium d) Organic matter

14. Excess fluorides in drinking water is likely to cause
a) Blue babies b) Fluorosis
c) Taste and odour d) Intestinal irritation

15. Disinfection of water is used to remove
a) Bacteria b) Odour c) Turbidity d) Colour

16. Brackish water is found in
a) Estuaries b) Salt lake c) Polar Ice caps d) Both a) and b)

17. Which one of the following is not a renewable energy?
a) Fossil Fuels b) Solar energy c) Wind energy d) Tidal wave energy

18. Natural gas consists mainly of
a) Ethane b) Propane c) Butane d) Methane

19. Which of the following is considered as an alternate promising Fuel?
a) CNG b) Kerosene c) Coal d) Petrol

20. Bio mass consists of
a) Lignin b) Hermicellulose c) Cellulose d) All of these

21. Nuclear power is being produced from
a) Carbon - 14 b) Uranium
c) Petroleum combustion d) Natural gas

22. Direct conversion of solar energy is attained by
a) Solar Photo voltaic system b) Solar diesel hybrid system
c) Solar thermal system d) Solar air heater

23. Pollutant waste water discharged from industries is known as
a) Effluent b) Sludge c) Pathogens d) Contaminant

24. Aanaerobiosis makes water
a) Clear b) Mudy c) Red d) Browinish or blackish

25. Which of the following is causes Entriphication
a) Nitrates b) Phosphates c) Heavy metals d) Both a) and b)

26. The word pollution is derived from the latin word
a) Pollute b) Pollutant c) Pollure d) Play- tant

27. Which of the following are non-bio degradable?
a) Plastics b) Domestic sewage c) detergent d) a) and c)

28. Which of the following is secondary air pollutant?
a) Carbon monoxide b) Ozone c) Sulphur dioxide d) Carbon dioxide

29. Minamata Disease is caused due to
a) Lead b) Arsenic c) Mercury d) Cadmium

30. Increase in asthma attacks has been linked to high level of
a) Nitrogen b) Oxygen c) Air-borne particles d) All of these

31. Which of the following is an air pollutant?
a) Carbon b) Oxygen c) Nitrogen d) Particulate matter

32. Demography is the study of
a) Animals behaviour b) Population growth
c) River d) None of these

33. The urban solid waste is known as
a) Garbage b) Rubbish c) Refuge d) Silt

34. Activated sludge process is
a) Anaerobic method b) Aerobic method
c) Both a) and b) d) Land filling

35. Which toxic component not found in e-waste
a) Mercury b) Cadmium c) Neon d) Lead

36. Disposal of Bio-medical waste is by
a) Autoclave and land filling b) Incineration
c) Both a) and b) d) Landfilling

37. What does e-waste stands for
a) Environment waste b) Equipment waste
c) Electronic waste d) None of these

38. Which country producers maximum e-waste per year
a) India b) USA c) China d) France

39. What is the hazardous pollutant released in LED's?
a) Barium b) Arsenic c) Cobalt d) Cadmium

40. Under the E-Waste Management Rules 2016, who is responsible for the collection of e-waste from end-users
a) Retailer b) Manufacturers c) Bulk consumers d) Informal cycles

41. What percentage of e-waste is typically recycled Globally?
a) 10% b) 20% c) 40% d) 60%

42. What is the first step in the e-waste recycling process?
a) Shredding b) Sorting c) Melting d) Crushing

43. Which component often contain valuable metals like Gold, Silver and Copper?
a) Printed circuit boards b) Glass screens
c) Plastic casing d) Power cords

44. What are the health hazards which can caused by e-waste?
a) Lung cancer b) DNA Damage c) Brain d) All of these

45. Where should syringe Disposed?
a) Pharma pail b) Sharps container c) Gray tote d) Red pail

46. Which is the hazardous pollutant which can caused by e-waste, released from electron?
a) Arsenic b) Barium c) Cadmium d) Cobalt

47. Where should blood product pack to dispose?
a) Gray totte/yellow pail b) Regular waste
c) Pharma pail d) Red pail

48. Which one is Muncipal Solid Waste?
a) Toxic b) Hazardous c) Non-Toxic d) Non-Hazardous

49. Nickel is released from _____
a) Display b) Calculator c) Alloy d) None of these

50. Which is the hazardous pollutant occurs is plastic?
a) Lithium b) PCB's c) Lead d) Copper

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CBCS SCHEME

BCS508

USN | | | | | | | | | |

Question Paper Version : B

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Environmental Studies and E – Waste Management

Time: 1 hr. Max. Marks: 50

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USN | | | | | | | | | | |

Question Paper Version : C

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Environmental Studies and E – Waste Management

Time: 1 hr. Max. Marks: 50

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CBCS SCHEME

BCS508

USN | | | | | | | | | | |

Question Paper Version : D

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Environmental Studies and E – Waste Management

Time: 1 hr. Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. Nuclear power is being produced from
a) Carbon - 14 b) Uranium
c) Petroleum combustion d) Natural gas

2. Direct conversion of solar energy is attained by
a) Solar Photo voltaic system b) Solar diesel hybrid system
c) Solar thermal system d) Solar air heater

3. Pollutant waste water discharged from industries is known as
a) Effluent b) Sludge c) Pathogens d) Contaminant

4. Aanaerobiosis makes water
a) Clear b) Mudy c) Red d) Browinish or blackish

5. Which of the following is causes Entriphication
a) Nitrates b) Phosphates c) Heavy metals d) Both a) and b)

6. The word pollution is derived from the latin word
a) Pollute b) Pollutant c) Pollure d) Play- tant

7. Which of the following are non-bio degradable?
a) Plastics b) Domestic sewage c) detergent d) a) and c)

8. Which of the following is secondary air pollutant?
a) Carbon monoxide b) Ozone c) Sulphur dioxide d) Carbon dioxide

9. Minamata Disease is caused due to
a) Lead b) Arsenic c) Mercury d) Cadmium

10. Increase in asthma attacks has been linked to high level of
a) Nitrogen b) Oxygen c) Air-borne particles d) All of these

11. What percentage of e-waste is typically recycled Globally?
a) 10% b) 20% c) 40% d) 60%

12. What is the first step in the e-waste recycling process?
a) Shredding b) Sorting c) Melting d) Crushing

13. Which component often contain valuable metals like Gold, Silver and Copper?
a) Printed circuit boards b) Glass screens
c) Plastic casing d) Power cords

14. What are the health hazards which can caused by e-waste?
a) Lung cancer b) DNA Damage c) Brain d) All of these

15. Where should syringe Disposed?
a) Pharma pail b) Sharps container c) Gray tote d) Red pail

16. Which is the hazardous pollutant which can caused by e-waste, released from electron?
a) Arsenic b) Barium c) Cadmium d) Cobalt

17. Where should blood product pack to dispose?
a) Gray totte/yellow pail b) Regular waste
c) Pharma pail d) Red pail

18. Which one is Muncipal Solid Waste?
a) Toxic b) Hazardous c) Non-Toxic d) Non-Hazardous

19. Nickel is released from _____
a) Display b) Calculator c) Alloy d) None of these

20. Which is the hazardous pollutant occurs is plastic?
a) Lithium b) PCB's c) Lead d) Copper

21. Which of the following is an air pollutant?
a) Carbon b) Oxygen c) Nitrogen d) Particulate matter

22. Demography is the study of
a) Animals behaviour b) Population growth
c) River d) None of these

23. The urban solid waste is known as
a) Garbage b) Rubbish c) Refuge d) Silt

24. Activated sludge process is
a) Anaerobic method b) Aerobic method
c) Both a) and b) d) Land filling

25. Which toxic component not found in e-waste
a) Mercury b) Cadmium c) Neon d) Lead

26. Disposal of Bio-medical waste is by
a) Autoclave and land filling
b) Incineration
c) Both a) and b)
d) Landfilling

27. What does e-waste stands for
a) Environment waste
b) Equipment waste
c) Electronic waste
d) None of these

28. Which country producers maximum e-waste per year
a) India b) USA c) China d) France

29. What is the hazardous pollutant released in LED's?
a) Barium b) Arsenic c) Cobalt d) Cadmium

30. Under the E-Waste Management Rules 2016, who is responsible for the collection of e-waste from end-users
a) Retailer b) Manufacturers c) Bulk consumers d) Informal cycles

31. Blue baby syndrome is caused by contamination of water due to
a) Phosphates b) Sulphur c) Arsenic d) Nitrates

32. Major source of Flouride is
a) River water b) Ground water c) Food products d) Tooth paste

33. Out of the following Nutrients in Fertilizer which one causes minimum water pollution
a) Nitrogen b) Phosphorous c) Pottasium d) Organic matter

34. Excess fluorides in drinking water is likely to cause
a) Blue babies
b) Fluorosis
c) Taste and odour
d) Intestinal irritation

35. Disinfection of water is used to remove
a) Bacteria b) Odour c) Turbidity d) Colour

36. Brackish water is found in
a) Estuaries b) Salt lake c) Polar Ice caps d) Both a) and b)

37. Which one of the following is not a renewable energy?
a) Fossil Fuels b) Solar energy c) Wind energy d) Tidal wave energy

38. Natural gas consists mainly of
a) Ethane b) Propane c) Butane d) Methane

39. Which of the following is considered as an alternate promising Fuel?
a) CNG b) Kerosene c) Coal d) Petrol

40. Bio mass consists of
a) Lignin b) Hermicellulose c) Cellulose d) All of these

41. Which of the following conceptual spheres of the environment is having the least storage capacity of matter?
a) Atmosphere b) Lithosphere c) Hydrosphere d) Biosphere

42. In an eco-system, the flow of energy is
a) Bidirectional b) Cyclic c) Unidirectional d) Multi Directional

43. Which of the following is not a prominent Chemical responsible for a good habitat?
a) Oxygen b) Carbondioxide c) SO_2 d) Nutrients

44. In complex eco-systems, the degree of species Diversity is
a) Poor b) Medium c) High d) None of these

45. World Environment day is on
a) 5th May b) 5th June c) 18th July d) 14th August

46. Abiotic component includes
a) Soil b) Temperature c) Water d) All of these

47. The sequence of eating and being eaten in an ecosystem is
a) Food chain b) Carbon cycle c) Water cycle d) Anthropoco system

48. The organisms which directly feed on producer called
a) Herbivores b) Carnivores c) Ominivores d) Decomposer

49. In an eco-system biological cycling of materials is maintains by
a) Producer b) Consumer c) Decomposer d) All of these

50. Which pyramid is always upright
a) Energy b) Biomass c) Numbers d) Food chain

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CBCS SCHEME

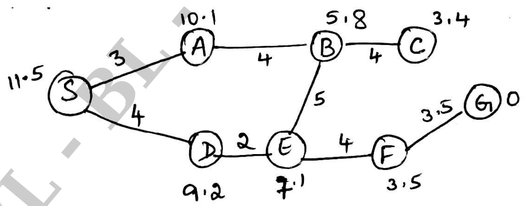
USN | | | | | | | | | | |

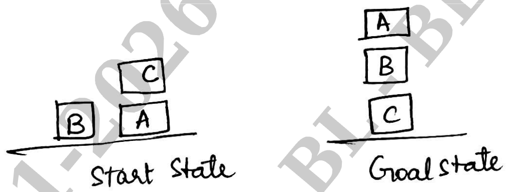
BCS515B

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Artificial Intelligence

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Explain Alan Turing's significant contribution to artificial intelligence and give a brief introduction to the Turing Test in AI.	**10**	**L2**	**CO1**
	b.	Define agent, agent function and agent program. Explain with a neat diagram how agent interacts with environment through sensors and actuators.	**10**	**L1**	**CO1**
		OR			
Q.2	**a.**	List the types of Agents. Explain Goal Based and utility based agent with neat diagram.	**10**	**L2**	**CO1**
	b.	Compare and contrast between i) Deterministic and Stochastic ii) Static and Dynamic iii) Episodic and Sequential iv) Fully observable and partially observable. Give example for each of the nature of environment given above.	**10**	**L2**	**CO1**
		Module – 2			
Q.3	**a.**	Explain the tree search and graph search algorithms.	**10**	**L2**	**CO2**
	b.	Explain problems solving agents along with algorithm and illustrate the incremental formulation of 8-Queens problem.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	List and explain the criteria to measure the performance of search strategies.	**10**	**L2**	**CO2**
	b.	Explain Breadth first search technique as a problem solving strategy with its benefits and shortcomings.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Explain A^* algorithm for shortest path and apply the same for the below graph.  Fig Q5(a)	**10**	**L3**	**CO3**

	b.	Apply heuristic search algorithm on the given 8 puzzle problem to reach the goal state from the initial state Start state: 1 | 2 | 3 | 4 | 6 7 | 5 | 8 Goal state: 1 | 2 | 3 4 | 5 | 6 7 | 8 |	**10**	**L3**	**CO3**
		OR			
Q.6	**a.**	Define knowledge based agent. Outline the knowledge based agent program.	**10**	**L1**	**CO3**
	b.	Define Propositional Logic. Explain syntax and semantics.	**10**	**L1**	**CO3**
		Module – 4			
Q.7	**a.**	Explain first order logic with its syntax in BNF form.	**10**	**L2**	**CO4**
	b.	Explain Quantifiers. Differentiate between Universal and Existential Quantifier.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Illustrate Kinship Domain with an example.	**10**	**L2**	**CO4**
	b.	Illustrate unification algorithm used for reasoning with example.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Outline the backward chaining algorithm for definite clauses. Construct a proof tree to prove that "west is a criminal".	**10**	**L2**	**CO5**
	b.	Apply Resolution for "west is a criminal" and "curiosity killed the cat" example.	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	Define Planning. Explain block world problem for the following start state and End state.  	**10**	**L2**	**CO5**
	b.	Illustrate how planning graph data structure can be used to give a better heuristic for a planning problem.	**10**	**L2**	**CO5**

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CBCS SCHEME

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BRMK557

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Research Methodology and IPR

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	**a.**	Define the term Research. Explain the research flow cycle with the help of a neat diagram.	**07**	**L2**	**CO1**
	b.	Interpret the factors that motivate Engineering Research.	**07**	**L2**	**CO1**
	c.	With the help of neat diagram, recall the 3 broad categories of developing and accessing knowledge in research.	**06**	**L1**	**CO1**
		OR			
Q.2	**a.**	What do you mean by Ethics? Recall the importance of practicing ethics in engineering research.	**07**	**L1**	**CO1**
	b.	Write short notes on the following : i) Fabrication ii) Plagiarism	**08**	**L2**	**CO1**
	c.	Explain in brief the 3 ways to credit the Research Contributions.	**05**	**L2**	**CO1**
		Module – 2			
Q.3	**a.**	Explain briefly the goals of conducting literature review in academic research.	**10**	**L2**	**CO2**
	b.	Explain how existing knowledge will act as a foundation for new knowledge.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Define Citation. Mention and explain the types of citations which fail to achieve their goals in benefiting the reader.	**10**	**L2**	**CO2**
	b.	With the help of neat diagram, illustrate how knowledge flows through a citation network.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	What is Intellectual Property? Discuss the role of IP in economic and cultural development of the society.	**10**	**L2**	**CO1**
	b.	List the type of inventions which are eligible for patenting and which are not patentable?	**10**	**L1**	**CO3**

		OR			
Q.6	**a.**	Define the term Patent. List and explain the conditions that must be met for obtaining a patent protection.	**10**	**L2**	**CO3**
	b.	With the help of neat diagram, explain the process of patenting an invention.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	What is Copy Right? Explain the criteria that a work must meet to qualify for Copy Right Protection.	**10**	**L2**	**CO4**
	b.	With the help of flowchart, explain the important steps involved in the process of copy right registration.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	What is a Trademark? Explain eligibility criterias for trademark and designation of Trademark Symbols.	**10**	**L2**	**CO4**
	b.	With the help of neat flowchart, explain the process of trademark registration.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	What is an Industrial Design? Explain the procedure for registering an industrial design.	**10**	**L2**	**CO5**
	b.	Explain the classification of Industrial Design.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	What is GI? Explain the mechanism available for the protection of rights related to GI.	**10**	**L2**	**CO5**
	b.	Discuss the case study of curcuma (turmeric) patent.	**10**	**L2**	**CO5**

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BTE755C

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Embedded Systems Applications

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the general features and characteristics that distinguish embedded systems from general purpose computers.	10	L2	CO1
	b.	Describe the difference between a Microprocessor Unit (MPU) and a Microcontroller Unit (MPU) with examples.	10	L2	CO1
		OR			
Q.2	a.	Discuss the significance of low power dissipation in embedded system and how it is achieved.	10	L2	CO1
	b.	Classify embedded systems based on MCU data word lengths and give example for each category.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the architectural differences between Von-Neumann and Harvard Architecture in microcontrollers and their impact on performance.	10	L2	CO2
	b.	What is RAM? What is static RAM? Explain the working of one bit SRAM cell with a neat diagram.	10	L2	CO2
		OR			
Q.4	a.	Discuss the main strategies used to design low power embedded systems and the importance of power management.	10	L2	CO2
	b.	Explain the purpose of pull up and pull down resistors in digital circuits and their role in microcontroller input pins.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain the working principle of a thermistor and how it can be used as a temperature sensor in embedded systems.	10	L2	CO3
	b.	Describe the types of light sensors commonly used in embedded systems and their typical applications.	10	L2	CO3

		OR			
Q.6	**a.**	Explain static and dynamic seven segment LED displays and their differences in power consumption and operation.	**10**	**L2**	**CO3**
	b.	Discuss the principle of stepper motors and the different driving methods used for controlling their rotation.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Explain the basic functional blocks of a mobile phone. Draw and label the block diagram of a mobile phone receiver.	**10**	**L2**	**CO4**
	b.	Describe the concept of frequency reuse in cellular networks and discuss how co-channel interference is mitigated. Draw a diagram illustrating frequency reuse with hexagonal cells.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain the working of an Antilock Braking System (ABS) in automobiles. Mention the key components. Draw the block diagram of the ABS system.	**10**	**L2**	**CO4**
	b.	Define a Brain Machine Interface (BMI) and describe its main stages. Draw a block diagram of a BMI system.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the concept of a systems perspective in embedded design. How does perspective help in understanding complex products?	**10**	**L2**	**CO5**
	b.	Outline the step by step procedure for product design starting from need identification to hardware software and mechanical design. Draw a block diagram summarizing this process.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Discuss the importance of ergonomic design in product development. What role do anthropometric measurements play? Provide examples where ergonomic design is critical.	**10**	**L2**	**CO5**
	b.	Describe the PCB design process from schematic symbol creation to routing and layers. Why is proper component placement important? Illustrate with a block flow diagram of PCB design steps.	**10**	**L2**	**CO5**

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CBCS SCHEME

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BCS501

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Software Engineering and Project Management

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the domains of software applications.	08	L2	CO1
	b.	Outline the unique nature of WebApps.	08	L2	CO1
	c.	Explain various software myths. Discuss.	04	L2	CO1
		OR			
Q.2	a.	Explain the activities performed in a software process framework?	06	L2	CO1
	b.	Explain the waterfall model along with its pros and cons.	08	L2	CO1
	c.	Explain specialized process models.	06	L2	CO1
		Module – 2			
Q.3	a.	Explain how groundwork parameters are established in requirements engineering.	08	L2	CO2
	b.	What is the importance of quality function deployment in eliciting requirements?	06	L1	CO2
	c.	How can we validate requirements?	06	L1	CO2
		OR			
Q.4	a.	Explain about scenario based modelling.	10	L2	CO2
	b.	Illustrate regarding how can we create a Behavioral Model.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain Agility along with the principles of Agility.	10	L2	CO3
	b.	Explain the Extreme Programming Process.	06	L2	CO3
	c.	Explain about the critics of XP.	04	L2	CO3
		OR			
Q.6	a.	Explain the scrum flow process.	08	L2	CO3
	b.	Explain the communication principles guiding framework activity.	08	L2	CO3
	c.	How can we validate and test principles in coding.	04	L1	CO3
		Module – 4			
Q.7	a.	Define Project. Show the contrast of software projects with other types of projects.	06	L2	CO4
	b.	Explain the ISO 12207 software development life cycle with a neat diagram.	10	L2	CO4
	c.	What are outsourced projects?	04	L1	CO4
		OR			
Q.8	a.	Illustrate the cost benefit evaluation techniques.	10	L2	CO4
	b.	Illustrate the concept of Risk evaluation.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain the details to be drafted for achieving quality in software.	06	L2	CO5
	b.	Explain the software quality characteristics of ISO 9126.	08	L2	CO5
	c.	Explain process requirements for the process quality management.	06	L2	CO5
		OR			
Q.10	a.	Explain about the decomposition techniques.	10	L2	CO5
	b.	Explain the COCOMO II model.	10	L2	CO5

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BCS502

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Computer Networks

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain fundamental characteristics and data representation in data communication.	6	L1	CO1
	b.	Discuss types of connection and the basic topologies in networks.	6	L1	CO1
	c.	Explain packet switching and circuit switching with neat diagrams.	8	L1	CO1
		OR			
Q.2	a.	Explain the layers of TCP/IP protocol suite.	8	L2	CO2
	b.	Explain types of packet switched networks and evaluate the total delay time of both.	12	L2	CO2
		Module – 2			
Q.3	a.	Explain types of errors and Hamming distance. Find the Hamming distance between the following : i) d(000, 011) ii) d(10101, 11110).	8	L3	CO2
	b.	Describe the working of CRC encoder and decoder. Perform division with respect to the following : Data word : 1001 Divisor : 1011.	12	L3	CO2
		OR			
Q.4	a.	Explain stop-and-wait protocol with FSM.	6	L2	CO2
	b.	Explain the three types of frames in HDLC.	8	L2	CO2
	c.	Discuss controlled-access protocol using reservation method.	6	L2	CO2
		Module – 3			
Q.5	a.	Explain the services offered by network layer.	6	L2	CO2
	b.	Define address space. Differentiate between classful addressing and classless addressing.	8	L2	CO2
	c.	Explain Network Address Resolution (NAT) with a neat diagram.	6	L2	CO3

		OR			
Q.6	**a.**	Explain IPv6 packet format in detail.	**6**	**L2**	**CO2**
	b.	Discuss D-V routing highlighting the importance of distance vector.	**7**	**L2**	**CO2**
	c.	Describe BGP protocol in detail.	**7**	**L2**	**CO4**
		Module – 4			
Q.7	**a.**	Explain the concept of port numbers mentioning ICANN ranges.	**5**	**L2**	**CO3**
	b.	Explain Go-Back-N protocol.	**9**	**L2**	**CO4**
	c.	Explain TCP segment format with a neat diagram.	**6**	**L3**	**CO3**
		OR			
Q.8	**a.**	Discuss the connection establishment in TCP.	**8**	**L2**	**CO3**
	b.	Explain error control in TCP using acknowledgements.	**4**	**L2**	**CO3**
	c.	Discuss three algorithms for handling congestion in TCP.	**8**	**L2**	**CO3**
		Module – 5			
Q.9	**a.**	Discuss application layer paradigms with neat diagram.	**5**	**L2**	**CO3**
	b.	Explain the use of sockets in process-to-process communication.	**7**	**L2**	**CO3**
	c.	Discuss the connection types in HTTP along with formats of messages.	**8**	**L2**	**CO3**
		OR			
Q.10	**a.**	Explain POP and IMAP protocols.	**8**	**L2**	**CO4**
	b.	Discuss the applications of SSH protocol.	**4**	**L2**	**CO4**
	c.	Explain resolution in DNS.	**8**	**L2**	**CO3**

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CBCS SCHEME

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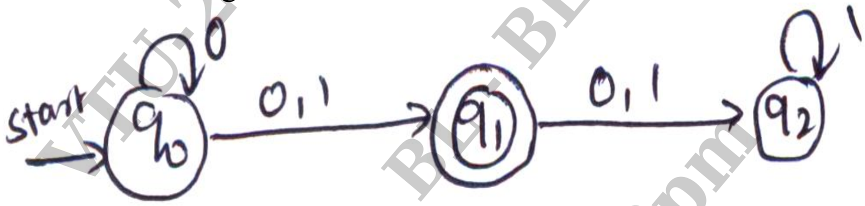
BCS503

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Theory of Computation

Time: 3 hrs. Max. Marks: 100

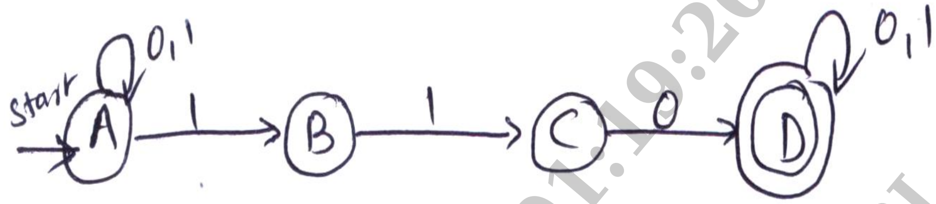
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Define the following with example. i) Alphabet ii) String iii) Power of an Alphabet iv) Language v) Problem	**05**	**L2**	**CO1**
	b.	Design DFA for the following languages. i) DFA to accept string of 0's, 1's and 2's beginning with a '0' followed by odd number of 1's and ending with a '2'. ii) $L = \{ W \in \{0,1\}^* : w$ does not have 001 as a substring$\}$	**08**	**L3**	**CO1**
	c.	Convert the following NFA to DFA. 	**07**	**L3**	**CO1**
		OR			
Q.2	**a.**	Design an NFA to recognize the following set of strings 0101, 101 and 011.	**05**	**L2**	**CO1**
	b.	Design an DFA to accept binary numbers divisible by 5.	**08**	**L3**	**CO1**
	c.	Obtain DFA for the following $\in$ – NFA (table below)	**07**	**L3**	**CO1**

δ	∈	a	b	c
→p	φ	{p}	{q}	{r}
q	{p}	{q}	{r}	φ
*r	{q}	{r}	φ	{p}

		Module – 2			
Q.3	**a.**	Write the Regular Expression for the following languages. i) $L = \{a^n b^m \mid n >= 4, m <= 3\}$ ii) RE to accept words with two or more letters but beginning and ending with the same letter where $\Sigma = \{a, b\}$	**06**	**L3**	**CO2**
	b.	Obtain $\in$ – NFA for given Regular Expression $(a + b)^* aa (a + b)^*$	**06**	**L3**	**CO2**
	c.	Find the minimized DFA of the following (table below)	**08**	**L3**	**CO2**

δ	a	b
→A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

		OR			
Q.4	**a.**	State and prove pumping theorem for regular languages. Show that the language $L = \{a^n b^n \mid n \geq o\}$ is not regular.	**06**	**L3**	**CO2**
	b.	Convert the following FA to RE using state elimination method. 	**06**	**L3**	**CO2**
	c.	Prove that the Regular Languages are closed under : i) Union ii) Complementation iii) Intersection iv) Difference	**08**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Design CFG for the following Languages. i) $L = \{ ww^R$ where $W \in \{a, b\}^* \}$ ii) $L = \{ 0^m 1^m 2^n \mid m \geq 1$ and $n \geq 0\}$ iii) $L = \{ a^n b^{n+3} \mid n \geq 0 \}$	**10**	**L3**	**CO3**
	b.	Consider the grammar G with productions $S \rightarrow aSbS \mid bSaS \mid \in$ Obtain LMD, RMD and parse tree for the string aababb. Is the grammar ambiguous.	**10**	**L3**	**CO3**
		OR			
Q.6	**a.**	Obtain PDA to accept the language $L = \{ wCw^R \mid W \in (a + b)^* \}$ and show the moves made by the PDA for the string aabCbaa.	**10**	**L3**	**CO3**
	b.	Convert the following CFG to PDA $S \rightarrow aABC$ $A \rightarrow aB \mid a$ $B \rightarrow bA \mid b$ $C \rightarrow a$	**10**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Define CNF. Convert the following CFG to CNF $E \rightarrow E + T/T \quad T \rightarrow T * F/F \quad F \rightarrow (E) / I \quad I \rightarrow Ia / Ib \mid a \mid b$	**10**	**L3**	**CO4**
	b.	State and prove pumping lemma for context Free Grammars. Show that $L = \{ 0^n 1^n 2^n \mid n \geq 1 \}$ is not content free.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	Define CNF convert the following CFG to CNF $S \rightarrow AB \quad A \rightarrow aA \mid bB \mid b \quad B \rightarrow b$	**10**	**L3**	**CO4**
	b.	Prove that the content free languages are closed under i) Union ii) Concatenation iii) Homomorphism	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Define a Turing Machine. Explain the working of a basic Turing machine with neat diagram.	**08**	**L2**	**CO5**
	b.	Design a Turing Machine to accept the language $L = \{ a^n b^n c^n \mid n \geq 1 \}$. Draw the transition diagram and show the moves made by TM for the string : aabbcc.	**12**	**L3**	**CO5**
		OR			
Q.10	**a.**	What are the programming Techniques for Turing Machine. Explain.	**10**	**L2**	**CO5**
	b.	Write short notes on : i) Multi Tape Turing Machine ii) Non Deterministic Turing Machine	**10**	**L2**	**CO5**