(6 pages)

Reg. No. : _____

Code No. : 10423 E **Sub. Code : EMCS 61**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2026.

Sixth Semester

Computer Science – Core

COMPUTER NETWORKS

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which OSI layer transmits raw bits over a physical medium?
   (a) Network (b) Data link
   (c) Physical (d) Transport
2. Pick the unguided transmission medium
   (a) Twisted pair
   (b) Coaxial cable
   (c) Optical fibre
   (d) Radio waves
3. TDM divides a shared link into fixed
   (a) Time slots
   (b) Frequency bands
   (c) Wavelength slots
   (d) Code Sequences
4. Trunk lines in telephony interconnect
   (a) Subscribers and handsets
   (b) Switching offices to each other
   (c) Satellites and earth stations
   (d) Modems and ISPs
5. Maximum Go-Back-N Window with 3-bit sequence numbers is
   (a) 3 (b) 7
   (c) 8 (d) 4
6. A hub forwards each incoming frame to
   (a) Only the destination port
   (b) The default gateway
   (c) Every connected port
   (d) The nearest router

7. In link-state routing, routers begin by
   (a) Swapping distance vectors
   (b) Issuing choke packets
   (c) Flooding link-state packets
   (d) Building Spanning trees
8. IP address 192.168.5.10 belongs to class
   (a) A (b) B
   (c) C (d) D
9. UDP offers which type of service?
   (a) Reliable, connection-oriented
   (b) Unreliable, connectionless
   (c) Reliable, connectionless
   (d) Unreliable, connection-oriented
10. Caesar cipher is categorised as
    (a) Asymmetric cryptography
    (b) Hash function
    (c) Public-key scheme
    (d) Symmetric Substitution cipher

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) List each OSI layer, its data unit, and one key function.

Or

(b) Contrast OSI and TCP/IP models by layer count and design philosophy.

12. (a) State the roles of local loop, trunks, and switching offices in telephony.

Or

(b) Classify GEO, MEO, and LEO satellites by altitude, delay, and typical use.

13. (a) Identify the limitations of stop-and-wait with a bandwidth-efficiency formula.

Or

(b) Compare CSMA/CD and CSMA/CA by their collision-handling mechanisms.

14. (a) Outline distance-vector routing and show one routing-table update cycle.

Or

(b) Demonstrate the leaky bucket algorithm for smoothing bursty traffic.

15. (a) Trace each message exchanged during TCP's three-way handshake.

Or

(b) Differentiate DES and AES by key length, block size, and rounds.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Examine twisted pair, coaxial, and fibre optic cables: bandwidth, attenuation, and applications.

Or

(b) Analyse Ethernet from 10 Mbps to Gigabit: frame format, CSMA/CD, and design evolution.

17. (a) Evaluate error detection and correction mechanism.

Or

(b) Compare FDM and WDM: Principles, guard bands, and deployment applications.

18. (a) Assess Bluetooth: Piconet, scatternet, FHSS, and the full protocol stack.

Or

(b) Justify Selective Repeat ARQ over Go-Back-N using Window size and throughput efficiency.

19. (a) Interpret every IPv4 header field including fragmentation offset and reassembly.

Or

(b) Investigate traffic shaping, choke Packets, and RED as network-layer congestion controls.

20. (a) Elaborate TCP segment Structure, Sliding-window flow control, and retransmission Strategy.

Or

(b) Solve a complete RSA example: key generation, encryption, and decryption with numbers.

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(7 pages) Reg. No. : _____

Code No. : 10424 E **Sub. Code : EMCS 62**

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2026

Sixth Semester

Computer Science – Core

.NET PROGRAMMING

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The .NET component responsible for executing managed code is the:
   (a) .NET Class Library
   (b) Visual Studio IDE
   (c) Common Language Runtime
   (d) ASP.NET Worker Process

2. Which *C# data type stores a single Unicode character?*
   (a) *string*
   (b) *char*
   (c) *byte*
   (d) *short*

3. *Namespaces in .NET are used primarily to:*
   (a) *Allocate heap memory*
   (b) *Handle HTTP requests*
   (c) *Manage database connections*
   (d) *Organise classes and prevent name conflicts*

4. *Which tool registers ASP.NET with IIS during setup?*
   (a) *aspnet_regiis.exe* (b) *RegSvr32.exe*
   (c) *IISReset.exe* (d) *msbuild.exe*

5. *The global.asax file raises events at the scope of the:*
   (a) *Page*
   (b) *User control*
   (c) *Application*
   (d) *Session*

6. HTML server controls differ from plain HTML elements because they:
   (a) Cannot fire events
   (b) Execute and are processed on the server side
   (c) Render as plain text only
   (d) Work only in Firefox

7. AutoPostBack causes a browser round-trip to the Server when a web control:
   (a) First renders on page load
   (b) Loses its CSS class
   (c) Has ViewState disabled
   (d) Detects a value change

8. In Visual Studio .NET, the web form designer generates code into the:
   (a) Code-behind file
   (b) Web.config only
   (c) Standalone CSS file
   (d) JavaScript bundle

9. Which ASP.NET validator ensures a field is not submitted empty?
   (a) RangeValidator
   (b) CompareValidator
   (c) RequiredFieldValidator
   (d) Custom Validator

10. View state persists page control data between postbacks by storing it in:
    (a) A server-side SQL table
    (b) A hidden form field (_VIEWSTATE)
    (c) A browser cookie
    (d) The URL query string

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) List the core components of the .NET Framework and state the function of each.

Or

(b) Contrast VB.NET with VB Script and Visual Basic 6 on object-orientation and compilation.

12. (a) Distinguish value types from reference types in .NET with memory allocation examples.

Or

(b) Describe the steps to install ASP.NET and configure IIS virtual directories for hosting.

13. (a) Explain the code-behind model in ASP.NET and how it separates UI from business logic.

Or

(b) State the purpose of Web.config and identify its key sections for security and error handling.

14. (a) Outline the AutoPostBack mechanism and how web control events are wired to handlers.

Or

(b) Describe the steps to create a Visual Studio .NET web project using the web form designer.

15. (a) Identify all ASP.NET validation controls and state the condition each is designed to check.

Or

(b) Distinguish view state, session state and application state by scope and persistence.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Examine the .NET Framework architecture: CLR, class library and language interoperability for C# and VB.NET.

Or

(b) Analyse variable declaration, scope, accessibility and object-based manipulation in C# with coded examples.

17. (a) Evaluate advanced class features in .NET: inheritance, polymorphism, constructors and destructors with examples.

Or

(b) Assess IIS architecture and detail the migration process from a classic ASP application to ASP.NET.

18. (a) Elaborate the ASP.NET web form lifecycle: page events from Init to Unload and the postback model.

Or

(b) Interpret HTML server control classes in ASP.NET and compare their properties with standard HTML elements.

19. (a) Investigate web, control classes: properties, event model, AutoPostBack and the ASP.NET control hierarchy.

Or

(b) Justify Visual Studio .NET as an IDE: IntelliSense, integrated debugger and web form designer workflow.

20. (a) Construct a complete ASP.NET form validation strategy using multiple validator types and a ValidationSummary.

Or

(b) Analyse view state, session state, and application state: storage mechanism scope and appropriate use cases.

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(7 pages) Reg. No. : _____

Code No. : 10425 E **Sub. Code : EMCS 63**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Science — Core

OPERATING SYSTEM

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which OS component acts as the intermediary between user programs and hardware?
   (a) Compiler (b) Loader
   (c) Kernel (d) Linker

2. A system call transfers control from user mode to kernel mode through:
   (a) A function pointer
   (b) A software trap or interrupt
   (c) A hardware DMA signal
   (d) A compiler directive

3. Round Robin scheduling prevents starvation by assigning each process a fixed:
   (a) Priority level (b) Memory partition
   (c) I/O burst limit (d) Time quantum

4. Shared memory IPC is faster than message passing because:
   (a) It encrypts data in transit
   (b) It requires fewer CPU registers
   (c) It uses kernel mediation for every transfer
   (d) Kernel involvement is not needed after initial setup

5. Peterson's solution to the critical section problem uses two shared variables:
   (a) Mutex and condition
   (b) Semaphore and count
   (c) Flag[ ] and turn
   (d) Lock and wait

6. In the Banker's algorithm a system is safe when:
   (a) All processes are blocked
   (b) A safe execution sequence for all processes exists
   (c) No process is currently requesting resources
   (d) Every resource instance is free

7. Swapping moves an entire process between main memory and
   (a) CPU cache
   (b) Secondary registers
   (c) Another CPU core
   (d) A backing store on disk

8. The page table maps logical page numbers to:
   (a) Virtual addresses directly
   (b) Physical frame numbers
   (c) Segment numbers
   (d) Cache line indices

9. Contiguous file allocation suffers from:
   (a) No fragmentation at all
   (b) Internal fragmentation only
   (c) Both external and internal fragmentation
   (d) Excessive inode table overhead

10. FCFS disk scheduling serves requests in:
    (a) The order they arrive in the disk queue
    (b) Shortest seek time order
    (c) Highest cylinder number first
    (d) Circular scan order

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) List the services an operating system provides.

Or

(b) Contrast multiprogramming and time-sharing operating systems.

12. (a) Outline the CPU scheduling criteria used to compare algorithms.

Or

(b) Describe the message-passing model of IPC with examples.

13. (a) Explain Peterson's solution and verify its three properties.

Or

(b) State the four necessary deadlock conditions with a resource graph.

14. (a) Distinguish contiguous from non-contiguous memory allocation.

Or

(b) Demonstrate the demand paging page-fault handler sequence.

15. (a) Identify file access methods and compare sequential vs direct.

Or

(b) Summarise FCFS and SSTF disk scheduling with a numerical example.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Examine monolithic, layered, microkernel, and modular OS structures.

Or

(b) Analyse the five categories of system calls with the execution flow of one.

17. (a) Evaluate Round Robin, SJF, and Priority scheduling with Gantt charts.

Or

(b) Assess hard and soft real-time scheduling: rate-monotonic and EDF algorithms.

18. (a) Elaborate binary and counting semaphores with the Bounded Buffer solution.

Or

(b) Investigate the Banker's algorithm: safety check and resource-request steps.

19. (a) Interpret paging: address translation, TLB operation, and effective access time.

Or

(b) Inspect demand paging, Optimal replacement, and the cause of thrashing.

20. (a) Compare contiguous, linked, and indexed file allocation methods.

Or

(b) Justify SCAN and C-SCAN over FCFS using seek distance calculations.

(7 pages) Reg. No. : .....

Code No. : 10437 E **Sub. Code : EECS 61**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Science

Elective — ARTIFICIAL INTELLIGENCE

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A rational agent maximises its:
   (a) Execution speed
   (b) Code simplicity
   (c) Memory efficiency
   (d) Expected performance measure

2. In a fully observable environment, the agent:
   (a) Perceives the complete state at every time step
   (b) Only sees a partial view of the world
   (c) Receives noisy sensor readings
   (d) Receives delayed observations only

3. A* guarantees an optimal solution when its heuristic is:
   (a) Any positive integer
   (b) Always equal to the true cost
   (c) Admissible – never overestimates true cost
   (d) Consistent only with BFS

4. DFS uses memory proportional to:
   (a) The total graph nodes
   (b) Depth of deepest solution times branching factor
   (c) Number of explored nodes in the frontier
   (d) Number of goal states

5. The restaurant waiting problem is a classic example used to teach:
   (a) Decision tree learning from examples
   (b) Unsupervised clustering of inputs
   (c) A simple reflex agent behaviour
   (d) Reinforcement learning from rewards

6. Back propagation computes loss gradients with respect to each weight using:
   (a) The input data distribution
   (b) The activation function only
   (c) The learning rate schedule
   (d) The chain rule of calculus

7. Texture in an image describes:
   (a) Dominant colour values
   (b) Edge sharpness at object boundaries
   (c) Spatial patterns of intensity variation in a region
   (d) Motion vectors of objects

8. Linking pictures and words in CV enables tasks such as:
   (a) Faster edge detection
   (b) Image captioning and visual QA
   (c) Measuring pixel brightness only
   (d) Reducing file size

9. A robotic arm (manipulator) is designed primarily for:
   (a) Mobile navigation tasks
   (b) Aerial surveillance missions
   (c) Underwater exploration
   (d) Grasping and manipulation in fixed workspaces

10. Modern robot application domains include:
    (a) Only manufacturing
    (b) Only logistics warehouses
    (c) Manufacturing, surgery, exploration and service
    (d) Only space missions.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Elaborate the PEAS description for two different intelligent agents.

Or

(b) Formulate the six environment properties with one concrete example each.

12. (a) Reconstruct greedy best-first search with a traced example.

Or

(b) Justify why A* is complete and optimal with an admissible heuristic.

13. (a) Classify forms of machine learning and describe the goal of each.

Or

(b) Demonstrate backpropagation: forward pass, loss and weight update.

14. (a) Specify the steps of image classification using a CNN.

Or

(b) Examine activity recognition and pose estimation in computer vision.

15. (a) Tabulate robot hardware components: sensors, actuators and their roles.

Or

(b) Validate the necessity of learning for robots in unstructured environments.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Trace the history of AI from inception to current state of the art.

Or

(b) Distinguish the four agent types and rank them by increasing capability.

17. (a) Construct a full comparison of BFS, DFS, UCS and A* on all four criteria.

Or

(b) Critique DFS memory limits and explain iterative deepening as a solution.

18. (a) Verify decision tree expressiveness by showing how they represent Boolean functions.

Or

(b) Appraise deep learning for NLP: embeddings, recurrent networks and language models.

19. (a) Inspect the CNN architecture layer by layer: input to softmax output.

Or

(b) Map the image segmentation pipeline from raw pixels to labelled regions.

20. (a) Design an autonomous robot pipeline: sensing, planning and actuation.

Or

(b) Measure robot performance in application domains by task success and safety metrics.

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