Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - II) (New) (CBCS) Examination: March/April - 2026
Introduction to Web Technology (ECS1202)

Day & Date: Tuesday, 28-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple choice questions: **08**

1) HTML is _____ type of the language.
a) Scripting Language b) Markup Language
c) Programming Language d) Network Protocol

2) The BODY tag is usually used after _____ tag.
a) HTML tag b) TABLE tag
c) HEAD tag d) TITLE tag

3) <a> and are the tags used for _____.
a) Adding image b) Aligning text
c) Audio-voiced text d) Adding links to your page

4) Which of the following is a component of CSS style rule?
a) Selector b) Property
c) Value d) All of the above

5) Which HTML element is used to define a multi-line input field?
a) <text> b) <textarea>
c) <blocktext> d) <textfields>

6) Which of the following property is used to change the face of a font?
a) font-family b) font-style
c) font-variant d) font-weight

7) _____ keyword is used to declare variables in JavaScript.
a) String b) Dim
c) Var d) None of the above

8) Which attribute can be used with BODY tag to set background image?
a) Background b) Bgcolor
c) Vlink d) None Of Above

Q.2 Answer the following question. (Any Four) **08**

a) Define the term Web technology?
b) What is mean by Internet?
c) What is Frames?
d) Explain the Uses of CSS?
e) What is Navigator?
f) Explain Media type in CSS?

Q.3 Write short notes on the following. (Any Two) **08**

a) Animations in CSS
b) Control structure in JavaScript
c) Image tag in HTML

Q.4 Answer the following question. (Any Two) **08**

a) What is mean by tag? Explain types of tag with example.
b) Explain box model with example in CSS.
c) Explain different Text formatting tag with example

Q.5 Answer the following question. (Any One) **08**

a) What is mean by CSS? Explain types of CSS with Example.
b) What is Table? Explain <TABLE> tag with Example in HTML.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - III) (CBCS) Examination: March/April – 2026
Probability Theory – I (ECS0305)

Day & Date: Thursday, 02-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of any type of calculator is allowed.

Q.1 Select most correct alternative: **08**

1) How many different arrangements can be made with letters of the word "SUNDAY"?
a) $8!$ b) $6!$
c) $4!$ d) None of these

2) Probability of any event always lies between ____.
a) 0 to 1 b) -1 to 0
c) -1 to 1 d) - ∞ to ∞

3) If $X \to H\ (n = 5, m = 4, N = 100)$ then $E(X) =$ ____.
a) $^2/_5$ b) $^9/_5$
c) $^1/_5$ d) None of these

4) For a discrete random variable X if $E(X) = 3$ then $E(2X + 3) =$
a) 6 b) 9
c) 8 d) None of these

5) For which of the following distribution mean = variance?
a) Binomial distribution b) Poisson distribution
c) Hypergeometric distribution d) None of these

6) In ${}^nC_r$ ____.
a) $n > r$ b) $n < r$
c) $n \geq r$ d) None of these

7) In tossing coin, the events of getting head & tail are ____ events.
a) Mutually exclusive b) Exhaustive
c) Equally likely d) All of above

8) If X is discrete random variable with pmf $p(x)$ then $E(x) =$ ____.
a) $\sum x\ p(x)$ b) $\sum x^2\ p(x)$
c) $\sum p(x)$ d) None of these

Q.2 Answer the following question. (Any Four) **08**

a) State addition principle of counting.
b) Define Combination.
c) State mean & variance of Hypergeometric distribution.
d) If X is Poisson distribution with parameter $m = 4$ then find $P(X = 0)$.
e) Define Sample Space with illustration.
f) If X is discrete random variable taking values $0, 1, 2, 3$ with probabilities $0.1, 0.2, 0.4$ & K respectively. Then find the value of K.

Q.3 Attempt the following. (Any Two) **08**

a) State any four properties of cumulative distribution function of discrete random variable.
b) Define Binomial distribution. State its mean and variance.
c) Define:
  i) Pairwise independence
  ii) Mutual independence for any three events A, B & C

Q.4 Answer the following question. (Any Two) **08**

a) How many three-digit numbers can be formed using the digits 4, 5, 6, 9 if
  i) repetition of digit is not allowed
  ii) repetition of digit is allowed
b) Given: $P(A) = 0.2 \quad P(B) = 0.7$ then find $P(A \cup B)$ if events A & B are
  i) mutually exclusive events
  ii) independent events
c) If $X \rightarrow B\ (30, 0.4)$ then find mean & variance of X.

Q.5 Answer the following. (Any One) **08**

a) State axioms of probability. Prove that probability of an impossible event is zero.
b) The probability mass function of random variable X is as follows:

X	-2	-1	0	1	2	3
$p(x)$	0.1	K	0.2	$2K$	0.3	K

Find –
  i) The value of K
  ii) c.d.f of r.v. X
  iii) $P(X > 0)$
  iv) $P(-1 \leq X < 2)$

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - I) (CBCS) Examination: March/April - 2026
Basics of Operating System (ECS1103)

Day & Date: Tuesday, 28-04-2026 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.

Q.1 Multiple choice questions: **08**

1) The starvation problem faced in _____ scheduling algorithm.
a) FCFS b) SJF
c) Priority d) RR

2) The number of processes completed per unit time is known as _____.
a) Output b) Throughput
c) Efficiency d) Capacity

3) Which of the following is not the state of a process?
a) New b) Old
c) Waiting d) Running

4) The critical section problem is a problem faced by _____.
a) Co-operating processes b) O.S processes
c) User processes d) None of these

5) A deadlock can be broken by _____.
a) abort one or more processes to break the circular wait
b) abort all the process in the system
c) preempt all resources from all processes
d) none of the mentioned

6) Which of the following is not an operating system?
a) Windows b) Linux
c) Oracle d) DOS

7) Which scheduling algorithm is non-preemptive?
a) Round robin b) SJF
c) FCFS d) Priority scheduling

8) Binary semaphore is also called _____.
a) Mutex b) Monitor
c) Deadlock d) Thread

Q.2 Answer the following question. (Any Four) **08**

a) What is a Batch System?
b) What is a PCB?
c) Define semaphore.
d) List different process states.
e) Define preemptive scheduling

Q.3 Write short notes. (Any Two) **08**

a) What is a Context Switch? Explain in detail.
b) What is Reader-Writer Problem?
c) What is deadlock? Explain necessary conditions of deadlock.

Q.4 Answer the following question. (Any Two) **08**

a) Explain the FCFS scheduling algorithms with examples
b) What is process synchronization? Explain in detail
c) What is Round Robin scheduling?

Q.5 Answer the following question. (Any One) **08**

a) Explain the functions and services of an Operating System in detail.
b) Explain the Dining Philosopher Problem and its solution.

SLR-OB-41

Seat No.	

Set P

B.Sc. (E.C.S.) (Semester - I) (CBCS) Examination: March/April – 2026
Programming using 'C' (ECS1104)

Day & Date: Wednesday, 29-04-2026 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple Choose Questions. **08**

1) Which is multi-way decision?
a) if b) switch
c) for d) while

2) sizeof is _____.
a) function b) operator
c) keyword d) variable

3) Which is string function?
a) strlen() b) scanf()
c) printf() d) main()

4) Infinite loop _____.
a) for(;;) b) for(i=0;i<10;i++)
c) while(i<5) d) None

5) Pointer symbol _____.
a) & b) *
c) % d) #

6) Array is _____.
a) group of variables b) single value
c) pointer d) function

7) scanf is used for _____.
a) output b) input
c) loop d) decision

8) break is used to _____.
a) stop loop b) continue
c) return d) print

Q.2 Answer the following question. (Any Four) **08**

a) Flowchart symbols
b) Variables and constants
c) Operators

d) Structure of C
e) Escape sequences

Q.3 Write short notes on the following. **08**

a) Multi-dimensional array
b) String functions
c) Scope of variables

Q.4 Answer the following question. (Any Two) **08**

a) Explain Functions and its types in details.
b) What is Recursion? Explain with example.
c) What are the Advantages of pointers?

Q.5 Answer the following question. (Any One) **08**

a) Write program to display single digit number in words using switch.
b) Explain call by reference with example.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - I) (CBCS) Examination: March April – 2026
Advanced Electronics (Paper – II) (ECS1109)

Day & Date: Saturday, 02-05-2026 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagram.

Q.1 Multiple choice questions: **08**

1) The basic material used for IC fabrication is _____.
a) Copper b) Germanium
c) Silicon d) Aluminum

2) Which process introduces impurities into silicon?
a) Oxidation b) Diffusion
c) Metallization d) Isolation

3) Epitaxial layer is grown on _____.
a) Metal layer b) Insulation layer
c) Silicon substrate d) Photoresist layer

4) Which logic family uses both NMOS and PMOS transistors?
a) TTL b) ECL
c) CMOS d) RTL

5) Which display device works on liquid crystal principle?
a) LED b) LCD
c) CRT d) Plasma

6) A Thermistor is a _____.
a) Light sensor b) Pressure sensor
c) Temperature sensor d) Proximity sensor

7) Which PCB has components mounted on one side only?
a) Multilayer PCB b) Double layer PCB
c) Single layer PCB d) Flexible PCB

8) SMD components are mounted using _____.
a) Through-hole technology b) Wire bonding
c) Surface mount technology d) Hand soldering

Q.2 Answer the following question. (Any Four) **08**

a) Define Digital IC
b) Define CMOS
c) what is LCD?
d) What is SMT?
e) What is SMD?

Q.3 Write short notes on the following. (Any Two) **08**

a) Diffusion process in IC fabrication
b) Seven segment display types
c) Write a note on Opto-coupler

Q.4 Answer the following question. (Any Two) **08**

a) Explain TTL logic family
b) Explain construction and working of LDR
c) Explain PCB technology

Q.5 Answer the following question. (Any One) **08**

a) Explain photolithography process with neat diagram.
b) Explain LCD display with construction, working and applications.

SLR-OB-45

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Set P

B.Sc. (E.C.S.) (Semester - II) (New) (CBCS) Examination: March/April- 2026
Operating System (ECS1203)

Day & Date: Wednesday, 29-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory
2) Figures to right indicate full marks.

Q.1 Multiple choice questions: **08**

1) The banker's algorithm is used for deadlock _____.
a) Prevention b) Avoidance
c) Detection d) Recovery

2) Memory management technique in which system stores and retrieves data from secondary storage for use in main memory is called _____.
a) Fragmentation b) Paging
c) Mapping d) None of the above

3) A file is a sequence of _____.
a) Bits b) Bytes
c) Lines d) All of the above

4) _____ algorithm has lowest page fault rate.
a) FIFO b) LRU
c) Optimal page replacement d) None of the above

5) _____ Memory allocation scheme suffers from external fragmentation.
a) Segmentation b) Pure demand paging
c) Swapping d) Paging

6) _____ allows directories to share subdirectories and files.
a) Acyclic graph b) Single level directories
c) Two level directories d) Tree structure directories

7) _____ memory management scheme loads all pages of a program from disk into main memory.
a) Paging b) Demand paging
c) Segmentation d) Demand segmentation

8) Virtual memory can be implemented with _____.
a) Segmentation b) Paging
c) Both a and b d) None of the above

Q.2 Answer the following. (Any Four) **08**

a) Define Wait for Graph.
b) What is Overlays?
c) What is fragmentation?
d) Define term Demand paging.
e) What is Swapping?
f) What is disk structure?

Q.3 Write Short Note. (Any Two) **08**

a) Write short note on Resource Allocation Graph.
b) Write short note on SCAN disk scheduling algorithms.
c) Write Short note on Concept of virtual memory.

Q.4 Answer the following question. (Any Two) **08**

a) What is Dead Lock? Explain characteristic of Deadlock.
b) Define Paging? Explain Paging with diagram.
c) Explain linked Allocation methods in details.

Q.5 Answer the following question. (Any One) **08**

a) Explain banker's algorithm in Deadlock Avoidance.
b) What is Segmentation? Explain Segmentation with advantages and disadvantage.

Seat No.	

Set P

B.Sc. (E.C.S.) (Semester - II) (New) (CBCS) Examination: March/April - 2026
Linear Algebra (ECS1206)

Day & Date: Thursday, 30-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Non programmable calculators are allowed.

Q.1 Choose the correct alternatives. **08**

1) The conjugate of complex number $5-4i$ is _____.
a) $5-4i$ b) $5+4i$
c) $4i$ d) 5

2) The real part of complex number $z=-3+8i$ is _____.
a) -3 b) $-3i$
c) 8 d) $8i$

3) The order of row matrix is _____.
a) $1\times n$ b) $m\times 1$
c) $n\times h$ d) $m\times h$

4) Order of augmented matrix for system of linear equations with m equations & n variables is _____.
a) $m\times n$ b) $(m-1)\times n$
c) $m\times(n+1)$ d) $n\times m$

5) The trace of given square matrix is _____.
a) Product of diagonal elements
b) sum of diagonal elements
c) Square of sum of diagonal elements
d) None of these

6) If $\begin{vmatrix} a & -4 \\ 3 & 1 \end{vmatrix} = 5$ then a =_____.
a) 4 b) -7
c) 9 d) 7

7) If any two rows or column of determinant are equal then its value is _____.
a) 1 b) -1
c) Infinite d) 0

8) If $\lambda = o$ is an eigenvalue of matrix A if & only if A is _____.

a) Square matrix b) Singular matrix
c) Non-singular matrix d) Triangular matrix

Q.2 Answer the following question. (Any Four) **08**

a) Find the area of triangle ABC having co-ordenates $A(3,3), B(0,0)\ C(4,0)$

b) Evaluate the determinant $A = \begin{bmatrix} 9 & -1 & 2 \\ -4 & 2 & 5 \\ 4 & 0 & -3 \end{bmatrix}$

c) Find the modulus & argument of complex number $z = 5 + 5\sqrt{3}\,i$

d) Write the augmented matrix of following system of equations
$2x + 4y - 3z + 5w = -3, x + y + 3z - 2w = 4, 3x + 3Z - w = 4$

e) Define scalar matrix with example.

f) If $Z_1 = 5 - 2i$ & $Z_2 = 4 + i$ find $Z_1 + Z_2$& $Z_1 - Z_2$

Q.3 Write short notes on the following. (Any Two) **08**

a) Verify that $\begin{bmatrix} 6 \\ -5 \end{bmatrix}$ eigenvector of $\begin{bmatrix} 1 & 5 \\ 6 & 2 \end{bmatrix}$

b) Define with examples.
i) symmetric matrix
ii) Skew symmetric matrix
iii) Upper triangular matrix &
iv) Lower triangular matrix

c) State Cayley Hamilton theorem. & define Eigen value and Eigen vectors of matrices.

Q.4 Answer the following question. (Any Two) **08**

a) Find the eigen values of $\begin{bmatrix} 2 & 3 \\ 3 & -6 \end{bmatrix}$

b) Find the square root of complex number the $3 + 4\mathrm{i}$

c) Solve by Gauss elimination method
$x + y + z = 6, x - y + z = 2, x + 2y - z = 2$

Q.5 Answer the following question. (Any One) **08**

a) By using Cramer's rule solve the following linear equations.
$x - y + 2z = 7, 3x + 4y - 5z = 5, 2x - y + 3z = 12$

b) Find inverse of matrix by adjoint method $A = \begin{bmatrix} 6 & 1 & 1 \\ 2 & -1 & 1 \\ 2 & 2 & -1 \end{bmatrix}$

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - III) (New) (CBCS) Examination: March/April – 2026
Data Structure using C++- I (ECS1301)

Day & Date: Thursday, 02-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple choice questions: **08**

1) Stack underflow condition occurs while performing ____ operation.
a) Create() b) Pop()
c) Push() d) Status()

2) Queue work in ____ Manner.
a) LIFO b) FILO
c) LILO d) FIFO

3) Node of ____ Linked list of contents two parts.
a) Singly b) Doubly
c) both a and b d) none of these

4) Which of the following data structure is linear type.
a) Array b) Queue
c) Linked List d) all of these

5) What is the index of the first element in a array?
a) 1 b) -1
c) 0 d) 2

6) Which of the following data structures is typically used to implement a Last-In, First-Out (LIFO) behavior?
a) Stack b) Queue
c) Linked list d) none of these

7) ADT stands for ____.
a) Analog discrete type b) Analog data type
c) Abstract discrete type d) Abstract data type

8) The postfix form of the given infix expression (A+B) *(C/D) is ____.
a) $AB+/CD^*$ b) $AB/^*CD+$
c) $AB+CD/^*$ d) $ABCD/^*+$

Q.2 Answer the following question: (Any Four) **08**

a) What is data structure.
b) What is stack.
c) What is priority queue.
d) Which are types of linked list.
e) Write stack overflow condition.

Q.3 Write short notes on the following: (Any Two) **08**

a) Doubly circular linked list.
b) Deque.
c) Abstract Data Type.

Q.4 Answer the following: (Any Two) **08**

a) Explain steps Convert infix expression into prefix expression $(a + b) - c^*(d^*e)$
b) Explain different Operations of array.
c) Write a program to implementation of Linear Queue using array.

Q.5 Answer the following question: (Any One) **08**

a) Explain different Operations of the queue?
b) What is linked list? Explain doubly circular linked list with its inserting operations.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - III) (New) (CBCS)
Examination: March/April - 2026
Linux OS and Shell Scripting (ECS1302)

Day & Date: Saturday, 04-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple choice question. **08**

1) To display the list of files and directories, _____ Linux command is used.
a) ls b) chmod
c) mkdir d) rmdir

2) Process information in the current shell can be obtained by using _____.
a) kill b) bg
c) fg d) ps

3) Which is the core of the operating system?
a) Shell b) Kernel
c) Commands d) Script

4) Which command is used to close the vi editor?
a) q b) wq
c) Both q and wq d) None of the mentioned

5) Which of the following is not a communication command?
a) grep b) mail
c) mesg d) write

6) In Linux, first value of permission provided to chmod command is meant for _____.
a) user b) group
c) world d) All of them

7) Linux command removes given directory _____.
a) ls b) chmod
c) mkdir d) rmdir

8) _____ Linux command creates zip file using given source file.
a) tar b) zip
c) gzip d) ls-l

Q.2 Answer the following question. (Any Four) **08**

a) Define Boot Loader.
b) What is Inode?
c) Define File System.
d) Define Shell and list out its any two types.
e) State use of If statement with syntax.
f) What is use of NFS protocol?

Q.3 Write short notes on the following. (Any Two) **08**

a) Explain Architecture of Linux.
b) Explain I/O and Redirection.
c) Explain Archive and File compression commands.

Q.4 Answer the following question. (Any Two) **08**

a) Comparisons between Linux O.S. and Windows O.S.
b) Explain Linux Distributions.
c) Explain Role of system administrator.

Q.5 Answer the following question. (Any One) **08**

a) Explain Linux commands (mkdir, rmdir, cd, pwd, ls, cat) syntaxes with output.
b) Write a shell script to convert this temperature into Centigrade degrees.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - III) (New) (CBCS) Examination: March/April - 2026
Software Engineering (ECS1303)

Day & Date: Monday, 06-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Choose correct alternative. (MCQ) **08**

1) Who is the father of Software Engineering?
a) Margaret Hamilton b) Watts S. Humphrey
c) Alan Turing d) Boris Beizer

2) CASE stands for ____.
a) Computer-Aided Software Engineering
b) Control Aided Science and Engineering
c) Cost Aided System Experiments
d) None of the mentioned

3) Which one of the following is not a software process quality?
a) Visibility b) Timeliness
c) Productivity d) Portability

4) Which two models doesn't allow defining requirements early in the cycle?
a) Waterfall & RAD b) Prototyping & Spiral
c) Prototyping & RAD d) Waterfall & Spiral

5) Which of the following does not affect the software quality and organizational performance?
a) Market b) Product
c) Technology d) People

6) Software testing is one element of a broader topic that is often referred to as ____.
a) Verification
b) Validation
c) Verification and Validation (V&V)
d) None of these

7) Methodology in which project management processes were step by step, ____.
a) Incremental b) Waterfall
c) Spiral d) Prototyping

8) _____ specification is also known as SRS document.

a) white-box b) grey-box
c) black-box d) None of the mentioned

Q.2 Answer the following. (Any Four) **08**

a) What is black Box testing?
b) What is software engineering?
c) What is feasibility study?
d) What is Decision tree?
e) What is Risk?

Q.3 Answer the following. (Any Two) **08**

a) Difference between Verification and Validation.
b) Explain Spiral model with diagram.
c) Explain types of maintenance.

Q.4 Answer the following. (Any Two) **08**

a) Difference between logical DFD and physical DFD.
b) Explain elements of System.
c) Explain Role of System analyst.

Q.5 Answer the following. (Any One) **08**

a) Explain classical model of SDLC.
b) What is normalization? Explain 1NF, 2NF, 3NF.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - III) (New) (CBCS) Examination: March/April – 2026
Database Management System - I (ECS1304)

Day & Date: Tuesday, 07-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple choice question: **08**

1) Which of the following is not a type of data model?
a) Hierarchical b) Network
c) Distributed d) Decentralized

2) The ability to query data, as well as insert, delete, and alter tuples, is offered by _____
a) TCL (Transaction Control Language)
b) DCL (Data Control Language)
c) DDL (Data Definition Language)
d) DML (Data Manipulation Language)

3) The _____ clause is used to list the attributes desired in the result of query.
a) Where b) Select
c) From d) Distinct

4) What is degree of table with 10 row and 6 columns?
a) 10 b) 6
c) 15 d) 50

5) The _____ constraint can only be applied at column level.
a) Foreign key b) Primary key
c) Not null d) None of these

6) The facility that allows nesting one select statement into another is called _____.
a) Nesting b) Binding
c) Sub query d) Encapsulating

7) The ____ operation, denoted by -, allows us to find tuples that are in one relation but are not in another.
a) Union b) Set-difference
c) Difference d) Intersection

8) '2467' is a _____.

a) integer
b) floating point
c) string
d) None of these

Q.2 Answer the following question. (Any Four) **08**

a) Define the term:
   i) Tuple
   ii) Domain
b) Distinguish between the truncate and delete command.
c) List database users.
d) List the limitations of file processing system.
e) What is Group function?
f) Distinguish between ALTER TABLE and UPDATE command.

Q.3 Write short notes on the following. (Any Two) **08**

a) What is a Database Models? Explain Hierarchical Model.
b) What is View? Write the steps to Create, Update and Drop a view?
c) Explain any four String functions with example.

Q.4 Answer the following question. (Any Two) **08**

a) Explain Components of DBMS.
b) Explain Specialization with example.
c) Explain Union and Set Difference operations in relational algebra.

Q.5 Answer the following question. (Any One) **08**

a) What is sub query? Explain types of sub query with example
b) What is Join? Explain types of Join with example.

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B.Sc. (E.C.S.) (Semester - III) (New) (CBCS) Examination: March/April - 2026
Probability Theory (ECS1305)

Day & Date: Wednesday, 08-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of logarithmic table and scientific calculator is allowed.

Q.1 Multiple choice questions. **08**

1) In a standard normal distribution, _____is the mean.
a) 0 b) 1
c) 0.5 d) None of these

2) If A and B are mutually exclusive events on sample space with $P(A) = 0.5$ and $P(B) = 0.4$ then $P(A \cup B) =$ ____.
a) 0.9 b) 0.2
c) 0.5 d) 1

3) If $X \rightarrow B(10,0.5)$ then mean of X is _____.
a) 10 b) 0
c) 5 d) None of these

4) _____ is the variance of a continuous uniform distribution defined on the interval $[a, b]$.
a) $\frac{(b-a)^2}{12}$ b) $\frac{(b-a)}{12}$
c) $\frac{(b+a)^2}{12}$ d) $(b-a)^2$

5) let X be a discrete r.v. having only one value K with probability 1 then _____.
a) $E(X) = K, V(X) = 0$ b) $E(X) = 1, V(X) = 0$
c) $E(X) = 0, V(X) = 0$ d) None of these

6) Variance of a constant is always _____.
a) 0 b) 1
c) Constant d) None of these

7) A family of distributions in which mean = variance is _____.
a) Normal b) Uniform
c) Poisson d) Binomial

8) If $X \to U(5,10)$ then mean of X is _____.

a) 5 b) 7

c) 7.5 d) None of these

Q.2 Answer the following question. (Any Four) **08**

a) Define probability mass function of discrete r.v. X.

b) Define mathematical expectation of continuous r.v X.

c) Define normal distribution.

d) State additive property of Poisson distribution.

e) The p.m.f.r.v. X is given bellow

X	2	4	6	8
$P(X)$	K	$2K$	$4K$	$3K$

Find the value of K

f) For binomial distribution, mean = 3 and variance is 2 find the parameters of binomial distribution.

Q.3 Attempt any Two of the following. **08**

a) State important properties of distribution function.

b) Consider an experiment of rolling a fair die. Let A be the event that an even number appears. B be the event that number bigger than 3 occurs. Find the probability that appearing on uppermost face is either even or bigger than 3.

c) If X is a r.v. with p.d.f.

$f(x) = 6x(1 - x) \quad 0 \leq X \leq 1$

$= 0 \quad \text{otherwise}$

Find mean and variance of r.v. X.

Q.4 Answer the following question. (Any Two) **08**

a) Explain how to find the mean and variance of a continuous uniform distribution. Provide a brief calculation for a uniform distribution defined on the interval $[0, 12]$.

b) State addition and multiplication principles of counting.

c) Let $X \to P(m)$ if $P(X = 2) = P(X = 1)$. Find the parameter m.

Q.5 Answer the following question. (Any One) **08**

a) State and prove addition theorem of probability for two events.

b) The p.m.f. of r.v. X is as follows.

X	-2	-1	0	1	2	3
$P(X)$	0.1	k	0.2	$2k$	0.3	k

Find:

i) The value of k ii) The mean of X

iii) variance of X iv) c.d.f. of r.v. X

Seat No.	

Set P

B.Sc. (E.C.S.) (Semester - III) (New) (CBCS) Examination: March/April - 2026
Data Science with Python (ECS1306)

Day & Date: Thursday, 09-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Choose the correct alternatives. **08**

1) Which of the following is a key aspect of data science?
a) Building dashboards b) Cleaning and analyzing data
c) Developing web pages d) Writing blogs

2) What happens during the Data Collection phase of the Data Science Life Cycle?
a) Data is stored in a database
b) Data is gathered from multiple sources
c) Data is split into training and test sets
d) Data is discarded

3) What is the primary goal of data cleaning in data science?
a) To remove duplicates
b) To visualize data
c) To identify and fix data quality issues
d) To split data

4) How do you load a CSV file into a Pandas DataFrame?
a) pd.load_csv() b) pd.read_csv()
c) pd.import_csv() d) pd.csv()

5) Which of the following input can be accepted by DataFrame?
a) Structured ndarray b) Series
c) DataFrame d) All of the mentioned

6) The _____ project builds on top of pandas and matplotlib to provide easy plotting of data.
a) yhat b) Seaborn
c) Vincent d) None of the mentioned

7) Which of the following is contained in NumPy library?
- a) n-dimensional array object
- b) tools for integrating C/C++ and Fortran code
- c) fourier transform
- d) all of the mentioned

8) Which of the following Python libraries is commonly used for web scraping to collect data from websites?
- a) NumPy
- b) Pandas
- c) BeautifulSoup
- d) Scikit-learn

Q.2 Answer the following question. (Any Four) **08**
- **a)** What is cross validation?
- **b)** What is secondary Data?
- **c)** What is Series?
- **d)** What is Data Normlization?
- **e)** What is Datatypes in ndarrays?

Q.3 Answer the following. (Any Two) **08**
- **a)** Explain Data Cleaning techniques.
- **b)** Write a program for transposing of arrays.
- **c)** Difference between overfitting and underfitting.

Q.4 Answer the following question. (Any Two) **08**
- **a)** Write a program to create a pandas Dataframe using dictionary.
- **b)** Explain statistical methods.
- **c)** Difference between tight coupling and loose coupling.

Q.5 Answer the following question. (Any One) **08**
- **a)** What is Regression Metrics? Explain its types.
- **b)** What is the need of visualization? Explain scatter plot and Box plot.

Seat No.	

Set | P |

B.Sc. (E.C.S.) (Semester - III) (New) (CBCS) Examination: March/April - 2026
Web Development using PHP (SEC-1)

Day & Date: Friday, 10-04-2026 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions **10**

1) The _____ data type variables hold single values.
a) scalar b) special
c) compound d) None of these

2) To make a connection between PHP and MySQL _____ function is used.
a) Mysql_connect() b) Mysqli_connect()
c) mysql_connect() d) mysqli_connect()

3) _____ is/are web server/s.
a) Apache HTTP b) Jigsaw
c) Lighttpd d) All of these

4) The _____ clause is used to filter records from database table.
a) UPDATE b) WHERE
c) ORDERBY d) ORDEREDBY

5) _____ function searches the specified value in an array.
a) search() b) array.search()
c) array_search() d) None of the above

6) _____ operator have lowest precedence.
a) new b) !
c) + d) or

7) To delete a PHP file _____ function is used.
a) unlink() b) link()
c) drop() d) None of these

8) The _____ function compares two strings.
a) cmp() b) strcmp()
c) compare d) match()

9) _____ function returns the length of a string.
a) cnt() b) Cnt()
c) strlen() d) None of these

10) To make a directory we can use _____ function.

a) mkdir() b) dir()
c) subdir() d) rmdir()

B) Fill in the blanks **06**

1) The .= operator is known as ____ operator.
2) PHP created by _____.
3) _____ is a symbol which is used to perform operation on operands.
4) _____ function is used to close connection between PHP and MySQL.
5) An actual parameter belongs to _____.
6) _____ function is used to create an array.

Q.2 Solve the following. (Any Eight) **16**

a) What is local server?
b) What is global variable?
c) What is magic constant?
d) What mysql constraints?
e) What is superglobal?
f) Write basic php syntax.
g) What is arithmetic operator?
h) What is hidden field?
i) What is state management?
j) What is metacharacter?

Q.3 A) Attempt the following. (Any Two) **10**

a) Write a PHP program to print odd numbers from 1 to 10.
b) What is parameter passing? Explain pass by value technique with simple program.
c) Explain indexed array with program.

B) Write short note on form control properties. **06**

Q.4 A) Attempt the following. (Any Two) **08**

a) Write a PHP program to find given number is prime or not.
b) Write difference between client side scripting vs sever side scripting.
c) Explain for loop. Write a simple program of it.

B) Define file and explain any three file opening modes. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Explain if statement and if ... else statement with their programs.
b) Consider a database name 'Demo', write a PHP-MySQL program,
i)To create a table named Emp(id INT,name VARCHAR(30),place VARCHAR(20))
ii)To insert 2 employee record (i.e. id,name,place) in above table.
c) Explain any eight advantages/characteristics of PHP.

Seat No.	

Set | P

B.Sc. (E.C.S.) (Semester - III) (CBCS)
Examination: March/April - 2026
Introduction to Python Programming (ECS0307)

Day & Date: Saturday, 04-04-2026 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions: **08**

1) Is Python code compiled or interpreted?
a) Python code is both compiled and interpreted
b) Python code is neither compiled nor interpreted
c) Python code is only compiled
d) Python code is only interpreted

2) Which keyword is used for function in Python language?
a) Function b) def
c) Fun d) Define

3) Which of the following statements is true?
a) A non-private method in a superclass can be overridden
b) A subclass method can be overridden by the superclass
c) A private method in a superclass can be overridden
d) Overriding isn't possible in Python

4) Which of the following types of loops are not supported in Python?
a) for b) while
c) do while d) None of these

5) What keyword is used in Python to raise exceptions?
a) try b) goto
c) except d) raise

6) Which of the following statements is not valid regarding the variable in python?
a) The variable_name can begin with alphabets
b) The variable_name can begin with an underscore
c) The variable_name can begin with a number
d) None of these

7) To add a new element to a list we use which Python command?

a) list1.addEnd(5) b) list1.addLast(5)
c) list1.append(5) d) list1.add(5)

8) Which of the following objects are present in the function header in python?

a) Function name and Parameters
b) Only function name
c) Only parameters
d) None of the these

Q.2 Answer the following question. (Any Four) **08**

a) Write down a syntax of a while loop.
b) Define list in python. Give one example
c) What are the supported data types in python?
d) What is the role of __init()__ method in python?
e) Differentiate between function and method?
f) What is the purpose of re module in python?

Q.3 Write short notes on the following. (Any Two) **08**

a) super() method
b) Dictionaries
c) Method overriding

Q.4 Answer the following question. (Any Two) **08**

a) Explain build in datatype in python.
b) What are the types of function in python?
c) Write a python program to check a number is PRIME or not.

Q.5 Answer the following question. (Any One) **08**

a) Explain control statements used in python with example.
b) Define exception. Explain exception handling in python with example.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - IV) (New) (CBCS) Examination: March/April - 2026
Data Structure using C++ - II (ECS1401)

Day & Date: Friday, 10-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions. **08**

1) Total number of comparison in a linear search is _____.
a) O(n logn) b) O(2n)
c) $O(n^2)$ d) O(n)

2) A graph is a tree if and only if graph is _____.
a) directed graph b) contain no cycle
c) planer d) completely connected

3) Which type of traversal of binary search tree output the value in sorted order?
a) Pre-order b) In order
c) Post-order d) None of these

4) Quick sort is also known as _____.
a) merger sort b) tree sort
c) shell sort d) partition and exchange sort

5) The number of external node in full binary tree with n internal node is _____.
a) n b) 2n
c) n+1 d) 2n+1

6) Finding the location of a given item in a collection of item is called _____.
a) Discovering b) Finding
c) Searching d) Mining

7) The Depth first search traversal of a graph uses _____ Data structure.
a) stack b) queue
c) Linked list d) array

8) Which of the following sorting uses Divide & Conquer structure?
a) Bucket sort b) Radix Sort
c) Merge Sort d) Counting

Q.2 Answer the following question. (Any Four) **08**

a) Define the term Ancestor & Descendent.
b) What is binary expression tree?
c) What is hashing?
d) What is closed path?
e) What is height of tree?
f) What is sorting?

Q.3 Attempt the following. (Any Two) **08**

a) List out application of tree.
b) Write a program for simple exchange sort.
c) Explain Different Hashing function.

Q.4 Answer the following question. (Any Two) **08**

a) Explain Dijkstra's Shortest path algorithm.
b) Explain BFS graph traversal method
c) Explain Radix sort.

Q.5 Answer the following question. (Any One) **08**

a) Write a program which implement graph using adjacency matrix for undirected and directed graph.
b) Write a program to implement binary search method.

Seat No.	

Set | P

B.Sc. (E.C.S.) (Semester - IV) (New) (CBCS) Examination: March/April - 2026
Core Java (ECS1402)

Day & Date: Saturday, 11-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple Choose Questions. **08**

1) The binding of data and methods into single unit is called _____.
a) Abstraction b) Polymorphism
c) Encapsulation d) Inheritance

2) What will be output of following block of java code?
String s= "solapur";
char c=s.charAt(3);
System.out.println(ch);
a) 0 b) 1
c) a d) Compile time error

3) _____ is not a primitive data type.
a) array b) byte
c) int d) char

4) _____ block is always executed regardless of what happens within the try block.
a) catch b) finally
c) final d) throw

5) _____ class of javax.swing is used for radio buttons.
a) RadioButton b) Radiobutton
c) JRadioButton d) J Radiobutton

6) What is the extension of java code file?
a) .txt b) .html
c) .byte d) .java

7) _____ is a selection statement in java.
a) if b) break
c) continue d) return

8) When we apply _____ method on a thread then it goes to runnable state.

a) stop() b) yield()
c) yeild() d) suspend()

Q.2 Answer the following question. (Any Four) **08**

a) What is use of this keyword?
b) What is use of super keyword in java?
c) Why java does not support pointer?
d) What is final class?
e) Why java is platform independent?
f) What is class? Write syntax of it.

Q.3 Attempt any Two of the following. **08**

a) Explain static block with any program of it.
b) Write a java program to print all even numbers from 1 to 10 in reverse order.
c) What is Exception handling? Write a program to handle Arithmetic Exception.

Q.4 Answer any Two of the following. **08**

a) What is method overriding? Write a program of it.
b) Explain multilevel Inheritance with a program.
c) What is interface? Write a java program of interface.

Q.5 Answer any One of the following. **08**

a) Explain Thread Life Cycle with a diagram.
b) Explain default and parameterized Constructor with their example.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - IV) (New) (CBCS) Examination: March/April - 2026
Software Testing (ECS1403)

Day & Date: Monday, 13-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple Choose Questions. **08**

1) The main objective of software testing is to _____.
a) Prove software is error-free
b) Detect defects and ensure quality
c) Increase development cost
d) Eliminate documentation

2) _____ is a static testing technique.
a) Unit Testing b) System Testing
c) Inspection d) Load Testing

3) Statement coverage is a part of _____.
a) Black box testing b) White box testing
c) Acceptance testing d) Non-functional testing

4) Boundary Value Analysis is used in _____.
a) White box testing b) Structural testing
c) Black box testing d) Regression testing

5) Alpha testing is performed by _____.
a) End users at client site b) Developers at client site
c) Testers at developer site d) Customers after release

6) Smoke testing is mainly used to _____.
a) Test all features in detail
b) Check critical functionality
c) Perform performance testing
d) Validate user requirements

7) Regression testing is performed when _____.
a) New software is developed b) Requirements are removed
c) Code changes are made d) Test plan is prepared

8) Selenium is mainly used for _____.
a) Manual testing b) Performance testing
c) Automated testing d) Security testing

Q.2 Answer the following question. (Any Four) **08**

a) Explain the importance of software testing.
b) Differentiate between Manual Testing and Automation Testing.
c) State advantages of White Box Testing.
d) What is Informal Review?
e) What is Functional Testing?
f) Write a short note on Smoke Testing.

Q.3 Answer the following question. (Any Two) **08**

a) Explain Black Box Testing and its advantages and disadvantages.
b) Describe Boundary Value Analysis with examples.
c) Explain Levels of Testing in detail.

Q.4 Answer the following question. (Any Two) **08**

a) Explain Integration Testing with its types.
b) Explain Software Test Life Cycle (STLC) with phases.
c) Describe Performance Testing with its types.

Q.5 Answer the following question. (Any One) **08**

a) Explain Defect Life Cycle and differentiate between Bug, Defect, Error, and Failure.
b) Explain Test Case. Write a test case template and design test cases for a Login Page.

Seat No.	

Set **P**

B.Sc. (E.C.S) (Semester - IV) (New) (CBCS) Examination: March/April – 2026
Database Management System - II (ECS1404)

Day & Date: Wednesday, 15-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagram and give equations wherever necessary.

Q.1 Multiple choice questions. **08**

1) Which of the following can execute a trigger in PL/SQL?
a) User b) Oracle server
c) Both user and oracle server d) None of these

2) A PL/SQL block begins with _____section.
a) Main b) Start
c) Declare d) Define

3) DBMS periodically suspends all processing and synchronizes its files through the use of _____facility.
a) Recovery b) Checkpoint
c) Backup d) Log

4) A _____ is a database object that groups logically related PL/SQL types, objects and subprograms.
a) Object b) Package
c) Module d) Schema

5) Which of the following is not a recovery technique?
a) Deferred update b) Immediate update
c) Two-phase commit d) Shadow paging

6) _____ helps solve concurrency problem.
a) Locking b) Transaction monitor
c) Serializability d) Two phase commit

7) _____ is an alternative of log based recovery.
a) Disk Recovery b) Shadow Paging
c) Locking d) Crash Recovery

8) Which of the following statement does not execute a trigger?
a) INSERT b) UPDATE
c) CREATE d) SELECT

Q.2 Answer the following. (Any Four) **08**

a) Define serializability.
b) What is checkpoints?
c) Define Stored Procedures.
d) What is Savepoints?
e) Concept of nested cursor.
f) What is Sub query?

Q.3 Write short notes. (Any Two) **08**

a) Shadow Paging
b) Procedures
c) Optimization

Q.4 Answer the following. (Any Two) **08**

a) What is Transaction? Explain ACID properties with example.
b) What is cursor? Explain explicit cursor and its attributes with example.
c) Explain timestamp based protocol.

Q.5 Answer the following. (Any One) **08**

a) What is trigger? Explain various DML operations to implement triggers.
b) Define Exception. Explain types of exceptions in details.

Seat No.	

Set P

B.Sc. (E.C.S.) (Semester - IV) (New) (CBCS) Examination: March/April - 2026
Descriptive Statistics (ECS1405)

Day & Date: Thursday, 16-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full mark.
4) Use of logarithmic table and calculator is allowed.

Q.1 Choose the correct alternate. **08**

1) The characteristics which change its value is called as _____.
a) attribute b) constant
c) variable d) None of these

2) If population is not homogeneous then use the _____ sampling method.
a) SRSWR b) SRSWOR
c) Stratified d) Systematic

3) The value of correlation coefficient always lies between _____.
a) 0 to 1 b) -1 to 1
c) -1 to 0 d) None of these

4) For distribution mean is 22 and mode is 18 then median is _____.
a) 19 b) 22
c) 4 d) None of these

5) The line of regression of X on Y is _____.
a) $Y - \bar{Y} = b_{YX}(X - \bar{X})$ b) $Y + \bar{Y} = b_{XY}(X + \bar{X})$
c) $X - \bar{X} = b_{XY}(Y - \bar{Y})$ d) All of theses

6) The mean of 73, 87, 86, x, 34 is 65.6 then x is _____.
a) 34 b) 22
c) 32 d) 48

7) _____ cannot be determined graphically.
a) A.M. b) Median
c) Mode d) Quartiles

8) If mean is 5 and variance is 16 then C.V. is _____.
a) (5/16)*100 b) (16/5)*100
c) (4/5)*100 d) (5/4)*100

Q.2 Answer any four of the following. **08**

a) Find the coefficient of range from following data
10, 48, 34, 73, 87, 22, 08, 19, 95

b) Define- perfect positive correlation with example.

c) Find first quartile for 45, 17, 35, 32, 22, 40, 19.

d) State any two advantages of sampling over census method.

e) Define term Class width and Mid point.

f) Write a merit of Median.

Q.3 Attempt any two of the following. **08**

a) Write properties of Karl Pearson's correlation coefficient.

b) Calculate Arithmetic mean of following data.

Class	$2-4$	$4-6$	$6-8$	$8-10$	$10-12$
Frequency	7	11	13	22	10

c) Find correlation coefficient between X and Y.

X	7.8	8.2	10.0	13.5	19.9
Y	68	49	44	37	22

Q.4 Answer any two of the following. **08**

a) Find the value of standard deviation of the following data.

Marks	$0-10$	$10-20$	$20-30$	$30-40$	$40-50$
No. of students	10	15	22	13	7

b) Write the procedure to construct the less than ogive curve.

c) Explain stratified random sampling.

Q.5 Answer any one of the. **08**

a) Draw the histogram from the following data. Hence determine the mode.

Classes	$10-18$	$20-28$	$30-38$	$40-48$	$50-58$	$60-68$
Frequency	7	13	18	22	8	5

b) Derive the least square regression line of Y on X.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - IV) (New) (CBCS) Examination: March/April - 2026
Data Visualization (ECS1406)

Day & Date: Friday, 17-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.

Q.1 Multiple choice questions. **08**

1) _____ type of relationship in Power BI connects two tables by matching rows based on common columns?
a) One-to-one b) One-to-many
c) Many-to-many d) Many-to-one

2) _____ DAX function is used to calculate the sum of a column for a specified filter context?
a) CALCULATE b) SUMX
c) SUM d) FILTER

3) What is Power Query used for in Power BI?
a) Creating dashboards and reports
b) Connecting to data sources and transforming data
c) Writing DAX formulas
d) Sharing reports with users

4) _____ used remove leading and trailing spaces from text data?
a) "Trim" option in the Format menu
b) "Change Type" function
c) "Split Column" function
d) "Remove Duplicates" function

5) What is the purpose of the "Unpivot" transformation in Power Query?
a) It converts rows into columns
b) It converts columns into rows
c) It merges multiple tables
d) It aggregates data into summaries

6) How can you remove empty rows from a dataset in Power Query?
a) Use the "Remove Blank Rows" option
b) Use the "Remove Duplicates" feature
c) Filter out null or blank values in specific columns
d) Use the "Replace Null Values" feature

7) What does the "Drillthrough" feature in Power BI allow you to do?
   a) Create calculated columns
   b) Allow users to access detailed reports from summary data
   c) Merge two tables together
   d) Set up automatic data refreshes

8) What is the primary function of the "Remove Duplicates" option in Power Query?
   a) To identify rows with missing values
   b) To remove duplicate rows based on selected columns
   c) To remove duplicate rows based on selected rows
   d) To merge tables based on unique values

Q.2 Answer the following questions. (Any Four) **08**

a) What is the purpose Q&A feature?
b) What is a calculated measure?
c) What is the role of Power BI Gateway?
d) What is the purpose of the “Get Data” feature?
e) What is the use of the "Text Filter"?
f) What is the difference between "SUM" and "SUMX" in DAX?

Q.3 Answer the following questions. (Any Two) **08**

a) How to combine data from different tables? Explain it.
b) How do you create and manage hierarchies in Power BI.
c) Difference between Calculated Columns and Measures.

Q.4 Answer the following question. (Any Two) **08**

a) Describe the process of cleaning data in Power Query.
b) Explain the building blocks of Power BI.
c) How can we filter data in Power BI?

Q.5 Answer the following question. (Any One) **08**

a) How do you use slicers in Power BI to enable interactive filtering of report visuals? Explain it.
b) What is KPI? What are the key requirements for designing an effective KPI in Power BI? Discuss the essential components.

Seat No.	

Set | P

B.Sc. (E.C.S.) (Semester - IV) (CBCS) Examination: March/April - 2026
Operating System (ECS0403)

Day & Date: Friday, 10-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions. **08**

1) Which of the following is a type of Operating System?
a) Batch b) Spreadsheet
c) Compiler d) Editor

2) The process state that indicates the process is waiting for some event is called ____.
a) Running b) Ready
c) Waiting d) New

3) What is the primary purpose of a Process Control Block (PCB)?
a) Manage Memory b) Store Process Information
c) Manage Files d) Handle I/O

4) Which scheduling algorithm assigns the CPU to the process that arrives first?
a) Round Robin b) SJF
c) FCFS d) Priority

5) The Producer-Consumer problem deals with ____.
a) Memory allocation b) Process synchronization
c) Deadlocks d) Scheduling

6) What data structure is used to represent deadlocks?
a) Queue b) Stack
c) Resource Allocation Graph d) Tree

7) Which memory management technique divides memory into fixed-size blocks?
a) Segmentation b) Paging
c) Contiguous allocation d) Overlay

8) Which disk scheduling algorithm selects the request with the shortest seek time?
a) FCFS b) SSTF
c) SCAN d) CSCAN

Q.2 Answer the following question. (Any Four) **08**

a) Define Operating System and explain its services.
b) What are threads? Explain the benefits of using threads.
c) Explain the Critical Section problem and its importance in process synchronization.
d) Describe the Deadlock Avoidance method with an example.
e) Explain the concept of paging and how it helps in memory management.

Q.3 Write short notes on the following. (Any Two) **08**

a) Process Scheduling criteria
b) Classical synchronization problems - Dining Philosopher problem
c) File Allocation Methods

Q.4 Answer the following question. (Any Two) **08**

a) Explain the concept of context switching with a neat diagram.
b) Discuss the different types of schedulers in process management.
c) Describe disk scheduling algorithms and their importance.

Q.5 Answer the following question. (Any One) **08**

a) Explain the concept of Virtual Memory. Describe the Page Replacement policies: FIFO and LRU.
b) Describe the structure of the file system in Operating System, and explain the directory structure types.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - IV) (CBCS) Examination: March/April - 2026
Optimization Techniques (ECS0406)

Day & Date: Saturday, 11-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of any type of calculator is allowed.

Q.1 Multiple Choose Questions. **08**

1) For maximization of LPP, the simplex method is terminated when all values _____.
a) $cj - zj \leq 0$ b) $cj - zj \geq 0$
c) $cj - zj = 0$ d) $zj \leq 0$

2) What is full form of MODI?
a) Modified Deduction Method
b) Modified Distribution Method
c) Multiple Distribution Method
d) None of these

3) Which of the following is not a method of solving T.P.?
a) VAM b) LCM
c) NWCR d) Hungarian

4) Every LPP is associated with another LPP is called _____.
a) LPP b) Primal
c) dual d) None of these

5) An A.P. is special type of _____.
a) T.P. b) A.P.
c) LPP d) All of these

6) In an IBFS of T.P. the number of occupied cells must be _____.
a) $m - n + 1$ b) $m - n - 1$
c) $m + n + 1$ d) $m + n - 1$

7) The cost associated with slack or surplus variable in objective function is _____.
a) One b) Positive
c) Negative d) Zero

8) In _____ problem no. of rows equal to number of columns.
a) Transportation b) Assignment
c) Linear Programming d) None of these

Q.2 Answer the following question. (Any Four) **08**

a) What is Assignment problem?

b) Define standard form of L.P.P.

c) Define surplus variables in L.P.P.

d) What is transportation problem?

e) Convert LPP in to standard form $\text{Max}\, z = 3x + 4y$

$\text{s.t.c}\ 3x + 2y \leq 6$

$2x + y \leq 1$

$x, y \geq 0$

f) Find dual of following LPP

$\text{Max}\, z = 3x_1 + x_2$

Subject to constraint

$x_1 + x_2 \leq 2$

$x_1 + 3x_2 \leq 4x_1,$

$x_2 \geq 0$

Q.3 Write note on. (Any Two) **08**

a) Write step by step procedure of converting primal of LPP to dual.

b) Write MODI method in T.P.

c) Explain difference between T.P. and A.P.

Q.4 Answer the following. (Any Two) **08**

a) A person is planning to buy to machines A and B. He can buy at most 8 machines in all. He needs at least 3 machines of type A and at least 2 of type B. He can buy not more than 5 machines of type A and not more 4 machines of type B. He earns a profit of Rs. 100 on machine A and Rs. 50 on machine B. Formulate the given LPP.

b) Find Solution of given LPP by using simplex method.

$$\text{Max}\, z = 7x_1 + 5x_2$$

Subject to constraint $x_1 + 2x_2 \leq 6$

$4x_1 + 3x_2 \leq 12$

$x_1, x_2 \geq 0$

c) Find IBFS of following T.P. by using NWCM

	W1	W2	W3	W4	ai
F1	30	25	40	20	100
F2	20	26	35	40	250
F3	31	33	37	30	150
bj	90	160	200	50	

Q.5 Answer the following. (Any One) **08**

a) Describe mathematical model of T.P. and formulate it as an LPP.

b) Solve following assignment problem to get maximum profit.

J/M	A	B	C	D
1	35	27	28	37
2	28	34	29	40
3	35	24	32	28
4	24	32	25	28

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
English (Compulsory)
Business English (ECS1501)

Day & Date: Tuesday, 28-04-2026 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory
2) Figures to right indicate full marks.

Q.1 Choose the correct alternatives from the options. **08**

1) _____ years I spent in ISRO.
a) 10 b) 20
c) 15 d) 11

2) Phatic Chakravorty is a _____ among the boys of village.
a) Boss b) Master
c) Leader d) Ringleader

3) His acts being _____ ages.
a) 7 b) 5
c) 8 d) 10

4) The name of king in The Queen's Rival.
a) Salaman b) Feroz
c) Akbar d) Shahjahan

5) Oliver Goldsmith was _____ novelist playwright and poet.
a) An Indian b) British
c) An American d) An Anglo-Irish

6) Money madness is written by _____.
a) D. H. Lawrence b) Rabindranath Tagore
c) Sarojini Naidu d) Dilip Chitre

7) Mr. Sharma teaches us Hindi. (passive voice)
a) Hindi is taught to us by Mr. Sharma.
b) Hindi was taught to us by Mr. Sharma.
c) Hindi is being taught to us by Mr. Sharma.
d) Hindi will be taught to us by Mr. Sharma

8) Get together means _____.
a) Respect b) Gather around
c) Come together d) Party

Q.2 Answer the following question in brief. (Any Four) **12**

a) What are the three visions for India?
b) Why did Phatik feel suffocated in the city?
c) What are the seven stages in All the stage is world?
d) What is money madness?
e) How is a village schoolmaster?
f) What does king do to fulfil queen Gulnar's wish?

Q.3 Answer the following. (Any One) **10**

a) What are 21st century skills and write its importance.

OR

b) What are the types of 21st Century skills and its importance.

Q.4 What are the 4 C's? (Learning skills). **10**

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Data Communication and Networking (ECS1502)

Day & Date: Wednesday, 29-04-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) The bit stream is broken into frames is job of _____.
   a) Data Link Layer b) Physical Layer
   c) Transport Layer d) Network Layer

2) Connection establishment in TCP is done by _____ mechanism.
   a) Flow control b) Three-Way Handshaking
   c) Forwarding d) Synchronization

3) In _____ the entire message stored at an intermediate node before forwarding.
   a) Circuit Switching b) Message Switching
   c) Packet Switching d) Hybrid Switching

4) _____ is not a guided transmission medium.
   a) Radio Waves b) Optical Fiber
   c) Twisted Pair d) Coaxial Cable

5) The device operation at data link layer is _____.
   a) Repeater b) Router
   c) Bridges d) Protocol

6) In _____ topology does a single cable act as the backbone for the entire network.
   a) Star b) Ring
   c) Bus d) Mesh

7) SMTP uses _____ TCP port.
   a) 22 b) 25
   c) 21 d) 23

8) ICMP is used for _____.
   a) Routing b) Error reporting
   c) Encryption d) Congestion control

9) The length of an IPv6 address is _____.
   a) 32 bits b) 64 bits
   c) 128 bits d) 256 bits

10) If routing information is automatically updated by routers when network configuration changes is called _____.
   a) dynamic routing b) fixed routing
   c) static routing d) distributed routing

B) Fill in the blank. **06**

1) MAC stands for_____
2) _____ protocol allows you to connect and login to a remote computer.
3) _____ layers of TCP/IP is analogous to the physical and the data link layers of an OSI model.
4) CRC stands for _____.
5) Router works at _____ layer in OSI Model.
6) _____ layer is responsible for encryption and compression.

Q.2 Solve any Eight of the following. **16**

a) Define Protocol.
b) Define Analog and Digital Signal.
c) What is framing?
d) Why use bridge?
e) Write any 4 design issues of data link layer.
f) Define flow control.
g) What is Buffering?
h) What is multiplexing? List types of multiplexing.
i) Write full form of SMTP and POP.
j) What is Gateway?

Q.3 A) Attempt any Two of the following. **10**

1) Explain ‘Stop and Wait ARQ’ protocol.
2) Why use Link State Routing algorithm? Explain in detail.
3) Compute CRC for the data 101101 using generator polynomial 1101.

B) Write a note on FTP protocol. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Write a difference between ARP and RARP.
2) Why use Hub device? Explain types of Hub.
3) What is topology? Explain types of topology.

B) Write a note on Pulse Code Modulation. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain OSI model in detail with diagram.
b) What is switching? Explain types of switching in detail.
c) What is CSMA/CD? Explain working process of CSMA/CD in detail.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Advanced Java (ECS1503)

Day & Date: Thursday, 30-04-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Each question should only one correct option.

Q.1 A) Multiple choice questions. **10**

1) A servlet maintain session in ____.
   a) Servlet Context b) Servlet container
   c) Servlet response heap d) Servlet request heap

2) How constructor can be used for a servlet?
   a) Initialization
   b) Constructor function
   c) Initialization and constructor function
   d) Setup() method

3) ____ cookie it is valid for single session only and it is removed each time when the user closes the browser?
   a) Persistent Cookie b) Non-persistent Cookie
   c) Both a and b d) None of these

4) Parameterized queries can be executed by ____.
   a) ParameterizedStatement
   b) PreparedStatement
   c) CallableStatement and Parameterized Statement
   d) All the above

5) ____ packages contains classes and interfaces for networking.
   a) java.io b) java.util
   c) java.net d) java.network

6) ____ method of DatagramPacket is used to find the port number?
   a) Port() b) getPort()
   c) findPort() d) receivePort()

7) Which of the following is not a core interface of Hibernate?
   a) Configuration b) Criteria
   c) SessionManagement d) Session?

8) Which one of the following is correct for directive in JSP?
   a) <%@directive%> b) <%!directive%>
   c) <%directive%> d) <%=directive%>

9) javax.servlet.Servlet is ____.
   a) Interface
   b) abstract class
   c) concreate class
   d) None of the above

10) ____ is the correct syntax to declare comments in JSP.
   a) <%-- This is JSP comment --%>
   b) <!-- This is JSP comment -->
   c) ..//..
   d) All of the above

B) Fill in the blank. **06**

1) The Java ____ specification defines an application programming interface for Communication between the Web server and the application program.
2) ____ module of the Spring Framework is used for building web applications.
3) JSTL sands for ____.
4) Servlet are used to program ___ component in a web application.
5) ____ Method can be used to read a form parameter in JSP.
6) ____ is the extension of Deployment Descriptor file in servlet.

Q.2 Solve the following. (Any Eight) **16**

a) Define ORM Tool.
b) What is the JDBC Statement?
c) What is Hibernate?
d) What are cookies?
e) Define Expression Tag in JSP.
f) Explain HttpSession in servlet?
g) What is mean by Session Object in JSP?
h) Define the term Servlet?
i) What is Spring?
j) What is Java Bean?

Q.3 A) Attempt the following. (Any Two) **10**

1) Write different Steps for Connecting to databases in JDBC?
2) Explain Table per Class in Hibernate.
3) Explain TCP/IP model in java networking

B) Short Notes. **06**

A) JSTL SQL tags.
B) Dependency injection.

Q.4 A) Attempt the following. (Any Two) **08**

1) Explain different implicit objects in JSP.
2) Explain Session in Servlet.
3) Explain different application of HB.

B) Explain Servlet Architecture with Features of Servlet? **08**

Q.5 Answer the following. (Any Two) **16**

a) Explain Types of Drivers in database connectivity.

b) Create a jsp page that will display current data and time and also display how many times user visited to the page.

c) Explain Working with GenericServlet and HttpServlet with example.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Dot NET Core (ECS1504)

Day & Date: Saturday, 02-05-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Choose and write correct answer from given alternatives: 10

1) What is the Elvis operator in C#?
   a) ?? b) ?.
   c) ++ d) ::

2) Which of these statement is used to take input from the console?
   a) Console. WriteLine() b) Console.ReadLine()
   c) Console.Input() d) Console.Print()

3) How is an enum declared?
   a) enum Days { Sunday, Monday }
   b) enum[Days] = { Sunday, Monday }
   c) Days = [Sunday, Monday]
   d) list Days = (Sunday, Monday)

4) What is a nullable type in C#?
   a) A type that can store both null and its normal range of values
   b) A type that can only store null
   c) A type that cannot be null
   d) A type that is always an object

5) The following code performs _____.
   int num = 20;
   object obj = num;
   a) Boxing b) Unboxing
   c) It's type casting d) It will cause a compile-time error

6) Which keyword is used to pass a parameter by reference?
   a) Ref b) out
   c) both a and b d) None of these

7) What does Thread.Sleep() do?
   a) Stops the program b) Pauses the current thread
   c) Terminates the application d) Terminate the thread

8) Which of the following is a generic collection class?
   a) List<T> b) ArrayList
   c) Hashtable d) Stack

9) Which keyword is used to manually throw an exception?
   a) Raise b) throw
   c) Error d) exception

10) Which serialization technique is fastest for communication?
   a) Binary b) JSON
   c) XML d) Text

B) Fill in the Blank. **06**

1) CLR Stands for _____.
2) _____ is the base class for all classes in .NET.
3) The use of sealed class is _____.
4) ____ keyword is used to allow a method to be overridden.
5) The _____ delegate represents a method that takes one parameter and returns a boolean value.
6) The LINQ query starts with the keyword _____ to define the data source.

Q.2 Solve the following. (Any Eight) **16**

a) What is namespace? Give one example.
b) Differentiate between boxing and unboxing.
c) What is the use of CLS?
d) What is a tuple in C#? Write its syntax.
e) What is a constructor? Write its syntax.
f) Differentiate between static and non-static members.
g) Differentiate between properties and indexers.
h) List any four built-in exceptions in C#.
i) Write the syntax to create your own event? Give one example.
j) What is thread priority? List its levels.

Q.3 A) Attempt the following. (Any Two) **10**

a) What is a structure in C#? How is it different from a class?
b) What is the try-finally construct? How is it useful in managing resources?
c) What is operator overloading? Give the example of binary operator overloading.

B) Write short note on multithreading with its advantages. **06**

Q.4 A) Answer of the following. (Any Two) **08**

1) Differentiate between foreground threads and background threads.
2) What are generic collections? Explain their advantages over non-generic collections.
3) Explain JSON serialization with a suitable example.

B) What is custom exception? Explain with suitable example. **08**

Q.5 Answer of the following. (Any Two) **16**

a) What is a delegate? Explain its syntax and working with a suitable example.

b) Explain .Net framework with suitable block diagram in detail.

c) How do you define and raise an event in C#? Write a program demonstrating custom events.

Seat No.	

Set | P

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Advanced Python Programming (ECS1505 - A)

Day & Date: Monday, 04-05-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose correct alternatives. **10**

1) In Python, threads are created using the _____ module.
   a) multiprocessing b) threading
   c) os d) time

2) To execute MySQL Stored Procedure in Python _____ is used.
   a) callproc() b) fetch()
   c) fetchall() d) cursor

3) _____ Python module is commonly used to connect to a MySQL database.
   a) cx_Oracle b) sqlite3
   c) mysql-connector-python d) OS

4) _____ method is used to bind a socket to an IP address and port.
   a) bind b) connect
   c) listen d) None of these

5) What method is used to make the main thread wait until another thread finishes?
   a) thread.pause() b) thread.join()
   c) thread.wait() d) thread.block()

6) _____ methods are used to retrieve results from cursor in mysql python connectivity.
   a) Fetchone() b) fetchall()
   c) fetchmany() d) All of these

7) _____ widget is used to accept single-line text input in tkinter.
   a) Label b) Button
   c) Entry d) Text

8) In tkinter fg is _____.
   a) Background b) Foreground
   c) Both a and b d) None of these

9) The _____ returns the number of thread objects that are active.
   a) threading.activeCount() b) threading.currentThread()
   c) threading.enumerates() d) None of these.

10) _____ GUI library is most commonly used in Python for GUI development.
   a) PyQt b) Tkinter
   c) WxPython d) Kivy

B) Fill in the blanks. **06**

1) _____ are the endpoints of a bidirectional communications channel.
2) The term REST stands for _____.
3) In python,The _____ function suspends (waits) execution of the current thread for a given number of seconds.
4) _____ layout method arrange a widget in two-dimensional table contains row (Horizontal) and column (Vertical) in Tkinter in GUI programming in python.
5) _____ command is used to create project “myside” in Django.
6) _____ widget in Tkinter is used as a container to organize other widgets.

Q.2 Solve the following. (Any Eight) **16**

a) What is session in Django?
b) Write advantages of GUI programming.
c) What is Thread Synchronization?
d) List out different methods in Thread.
e) What is socket?
f) List out the commands used in Django.
g) Write server socket methods.
h) What is the use of Event and Condition class in threading in python?
i) Write a note Entry and Button in Tkinter.
j) Which are the methods used in Layout Management in Tkinter?

Q.3 A) Attempt the following. (Any Two) **10**

1) Explain Lock in threading module with example.
2) What is difference between frame and canvas? Explain with example.
3) Explain Django Serialization with example.

B) What is REST? What is REST API? Explain Features of Django Rest Framework. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Write a program to display data in table form using tkinter.
2) What is thread? Write difference between process and thread.
3) What is view? Explain class-based views with example.

B) What are steps for database connectivity? Explain with example. **08**

Q.5 Attempt the following. (Any Two) **16**

a) What are different Events and Bindings? Write GUI application for addition of two number (use Entry, Button and Label).

b) What is MVT? Explain model, view and template with example.

c) Explain threading model and methods in Thread class in details.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Mobile Application and Development (ECS1505-C)

Day & Date: Monday, 04-05-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Android is _____.
   a) An operating system b) A web browser
   c) A web server d) All of the above

2) Android is based on Linux for the following reason.
   a) Security b) Portability
   c) Networking d) All of these

3) Which of the following is the name of the Android version 5.0?
   a) Cupcake b) Eclair
   c) KitKat d) Lollipop

4) Which element is used to display Google map in your UI?
   a) View b) Map
   c) MapView d) None of the above

5) The full form of ADB is _____.
   a) Android Delete Bridge b) Android Debug Bridge
   c) Android Destroy Bridge d) Android Developed Bridge

6) Component represents the single screen with the user interface.
   a) Activity b) Service
   c) Broadcast receiver d) Content provider

7) _____ is the built-in database in Android.
   a) MySQL b) Oracle
   c) MongoDB d) SQLite

8) Which element is used to display Google map in your UI?
   a) View b) Map
   c) MapView d) None of the above

9) For which of the following Android is mainly developed?
   a) Servers b) Desktops
   c) Laptops d) Mobile Phones

10) In android mini activities are also known as _____.
   a) Adapter b) Activity
   c) Fragment d) Intent

B) Fill in the blank. **06**

1) Android is based on _____ Language.
2) The Top most layer of android is _____.
3) _____ is the first callback method that is invoked by the system during an activity life-cycle.
4) In Linear layout by default orientation is _____.
5) A _____ is a small gadget or control of your android application placed on the home screen.
6) _____ compiler converts Java byte code into Dalvik byte code.

Q.2 Solve the following. (Any Eight) **16**

a) Write a note on Edit Text.
b) What is use of Geocoding?
c) What is intent filter?
d) Write usage of image switcher view.
e) What is Datepicker view in Android?
f) Explain Spinner widget.
g) List out Layouts in android.
h) Explain Java folder.
i) What is Web-Kit?
j) What is Toast? Write its Syntax

Q.3 A) Answer the following. (Any Two) **10**

1) Write the difference between Activities and Services in Android.
2) Explain directory Structure of Android application.
3) Explain how to create the first android application step by step.

B) Explain Linear Layout. **06**

Q.4 A) Attempt of the following. (Any Two) **08**

1) Explain directory Structure of Android application.
2) Explain Activity Life cycle.
3) Write the list of methods in Service.

B) What is Android SDK? **08**

Q.5 Attempt of the following. (Any Two) **16**

a) Explain Android architecture in detail with parts.
b) What are different Android Layout? Explain any one.
c) What are the basic views that can be used to design the UI of android applications? Explain it.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Theory of Computation (ECS1505-B)

Day & Date: Tuesday, 05-05-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) _____ of a string is any number of trailing symbols of the string including the string itself.
   a) suffix b) proper suffix
   c) prefix d) proper prefix

2) _____ is an abstract or user defined entity.
   a) alphabet b) string
   c) symbol d) set

3) Mealy machine has _____ Tuples.
   a) 5 b) 6
   c) 7 d) 8

4) Every NFA without ε moves has an equivalent _____.
   a) NFA b) DFA
   c) both a and b d) None of above

5) FA without output will be represented by using _____.
   a) Mealy machine b) Moore Machine
   c) both a and b d) None of these

6) Regular Expression is mathematical description of language.
   a) True b) False

7) $\delta: Q \times \{\Sigma \cup \varepsilon\} \rightarrow 2^Q$ is the transition function of _____.
   a) DFA b) NFA
   c) NFA with ε moves d) None of these

8) One or more number of a's followed by any number of b's is denoted by _____.
   a) a^+b^* b) $(a+b)^*$
   c) $a^*.b^*$ d) $(ab)^*$

9) In GNF productions in the following form _____.
   a) $A \rightarrow ABC$ or $A \rightarrow a$ b) $A \rightarrow AB$ or $A \rightarrow a$
   c) $A \rightarrow aA^*$ d) $A \rightarrow AB$ or $A \rightarrow aA$

10) Power set means set of all subsets.
a) True b) False

B) Fill in the blank/Definition/One sentence answer/One word answer/Give the name/Predict the product etc. **06**

1) The symbols which can be changed is called _____.
2) The productions which contain only one variable both at right side of production and left side of production that productions are called _____.
3) Regular Expression can perform union, concatenation _____ operations.
4) If $r = (a + b)^* a$ then $L(r) =$ _____.
5) TM contains is the language recognizer of recursively enumerable grammar.
6) PDA is mathematical model of PDM.

Q.2 Solve the following. (Any Eight) **16**

a) Find the language for the following regular expression.
$(0 + 11)^*(1 + 00)^*(0 + 11)^*$

b) If $R = \{(0,1), (1,2), (2,3)\}$ is a relation in $\{0,1,2,3\}$ find its R^*.

c) Design Mealy machine to find out 1's complement of a given binary number.

d) Design DFA which accept the language that starts with b over $\Sigma = \{a, b\}$.

e) What will be the language when Regular Expression $r = a^* b^+ c^*$.

f) Design a FA that reads strings made up of letters in the word 'reynolds' & recognize those strings that contain the word 'old' as a substring.

g) Check the following regular expression is equivalent or not.
$P = (rs + r)^* r \qquad Q = r(rs + r)^+$

h) Find the context free grammar for the following regular expression.
$a(a + b)^* ab(a + b)^* b$

i) Define PDM.

j) Define NFA with ε moves.

Q.3 A) Attempt the following. (Any Two) **10**

1) Convert the following grammar to GNF.
$S \to bA|aB, A \to bAA|aS|a, B \to aBB|bS|b$
2) State & explain Pumping lemma.
3) Convert the following NFA to DFA

Q/Σ	a	b	c
$\to A$	A	B	C
B	B	C	$-$
$^*C$	C	$-$	A

B) Define FSM. Design FSM for Divisibility for 3 tester. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) What is ambiguous grammar. Check whether following grammar is ambiguous or not. If Ambiguous, Remove the ambiguity.
   $E \rightarrow E + T|T$
   $T \rightarrow T^{*}F|F$
   $F \rightarrow (E)|a|b$
2) Define string, suffix of string, proper suffix of string, prefix of string, proper suffix of string.
3) Construct FA for following RE $(a + b)^{*} + (a + b)^{*}$

B) Write a note on simplification of CFG. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Construct DFA which accept even number of a's and even number of b's.

b) Construct PDA that accepts the language generated by CFG.
$S \rightarrow S + S|S * S|4|2$
Give the acceptance of string "$2 + 2 * 4$" by PDA.

c) Convert following grammar in CNF.
$S \rightarrow AB$
$A \rightarrow BS|b$
$B \rightarrow SA|a$

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - V) (New) (CBCS) Examination: March/April – 2026
Artificial Intelligence (Special Paper-XI) (ECS1506)

Day & Date: Wednesday, 06-05-2026 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) Explanation Based Learning is a type of _____ Learning.
   a) Inductive b) Deductive
   c) Reinforcement d) Statistical

2) Reasoning under uncertainty is handled using _____.
   a) Probability b) Heuristics only
   c) Rules only d) Truth tables

3) Which is a difficulty in knowledge acquisition?
   a) Tacit knowledge b) Time constraints
   c) Complexity of domain d) All of the above

4) In problem formulation, we define _____.
   a) Initial state, actions, goal state, path cost
   b) Rules only
   c) Utility function
   d) Environment only

5) Which is a famous medical expert system?
   a) MYCIN b) DENDRAL
   c) PROLOG d) ELIZA

6) A medical Al represents diseases as slots and symptoms as values. Which method is this?
   a) Frames b) Rules
   c) Semantic nets d) Probabilistic graphs

7) A taxi booking app predicts the best route using heuristics. Which algorithm fits?
   a) BFS b) DFS
   c) A* d) Minimax

8) In tic-tac-toe, the Al skips unnecessary branches that cannot influence the outcome. Which method is applied?
   a) BFS
   b) Alpha-Beta Pruning
   c) Hill Climbing
   d) A* Search

9) Which of these is a problem area addressed by expert systems?
   a) Medical diagnosis
   b) Weather prediction
   c) Troubleshooting
   d) All of the above

10) "There is a person who respects everyone" can be expressed in FOL using _____.
   a) $\exists x(\text{person}(x) \wedge \forall y(\text{person}(y) \rightarrow \text{respects}(x, y)))$
   b) $\forall x(\text{person}(x) \rightarrow \exists y(\text{person}(y) \wedge \text{respects}(x, y)))$
   c) $\exists x(\text{person}(x) \wedge \forall y(\text{person}(y) \rightarrow \text{respects}(y, x)))$
   d) $\forall x \forall y(\text{person}(x) \wedge \text{person}(y) \rightarrow \text{respects}(x, y))$

B) Fill in the blanks. **06**

1) Hill climbing search can get stuck in _____.
2) A heuristic is said to be admissible if _____.
3) In backward chaining, inference starts from _____.
4) A system derives new facts by applying resolution to clauses in CNF. This is called _____.
5) _____ is an inference rule states that if $P \rightarrow Q$ and P are true, then Q must be true.
6) Meta-knowledge is _____ about knowledge.

Q.2 Solve the following. (Any Eight) **16**

a) Define Model-based Reflex agents.
b) How dempster-Shafer differs from Bayes theorem?
c) Define Adversarial search.
d) What are the components of agent?
e) Write inference rule for "If a student studies hard, then the student will pass the exam. If a student passes the exam. Therefore, the student will get a scholarship."
f) What is forward reasoning?
g) Define decision Tree.
h) Define properties of search algorithms.
i) What are the types of expert systems?
j) What is Supervised Learning?

Q.3 A) Attempt the following. (Any Two) **10**

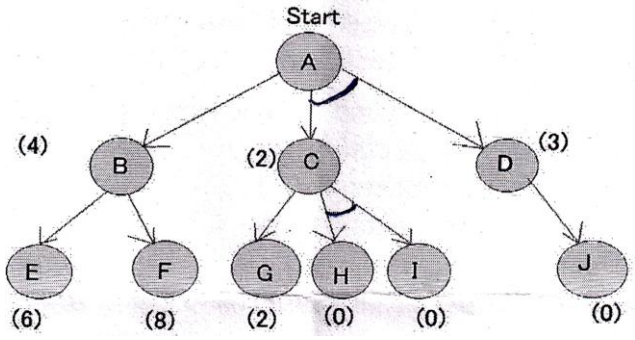
1) Explain knowledge acquisition method.
2) Explain alpha-beta pruning algorithm with example.
3) Consider the statements: "If you exercise daily, then you will be healthy. You didn't exercise daily. Therefore, you are not healthy." Identify the inference rule and prove with truth table whether the conclusion in logically valid or not.

B) Using Bayes' theorem, A doctor wants to determine the probability that a patient has COVID-19 given that the symptoms like fever and cough. A doctor is aware that covid-19 causes a patient to have a symptoms like fever, cough and it occurs 80% of the time. A patient has covid-19 disease is 350/1000. He has a symptoms like fever, cough is 60%. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Why constraint satisfaction problem? Solve SEND+MORE=MONEY using constraint satisfaction problem.
2) Represent the following statements in predicate form:
   i) All teachers are educated.
   ii) Some people like hiking and biking.
   iii) No student is absent today.
   iv) Every customer who buys a product gets a receipt.
3) Explain types of Hill Climbing Algorithm.

B) Solve the given graph using the AO* algorithm. All numbers in brackets are the heuristic value h(n). Each edge is considered to have a value of 1 by default. Find optimal path and cost. **08**



Q.5 Attempt the following. (Any Two) **16**

a) Explain the unification in detail. Find the unification between $P(a, g(x, a), f(y))$ and $P(a, g(f(b), a), x)$.

b) What is an Expert System? Discuss architecture with a diagram.

c) Consider the following statement and apply resolution graph to prove that goal:

a) Ramesh likes all food.
b) Rice and potato are food.
c) Anything eaten by anyone and still alive is food.
d) Ramesh eats potato and is still alive.

Prove the goal: “Ramesh likes rice.”

SLR-OB-72

Seat No.	

Set P

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
English (Compulsory)
Business English (ECS1601)

Day & Date: Tuesday, 28-04-2026 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Choose the correct alternatives. **08**

1) Jai Kisan Jay Jawan is a slogan by _____.
a) Rabindranath Tagore b) Leo Tolstoy
c) Lal Bahadur Shastry d) Robert Browning

2) What was Aksionov fond of when he was younger?
a) dancing b) sleeping
c) singing d) reading

3) The last line of the poem Endless Time is _____.
a) but I find that there is no time
b) We are too poor to be late
c) There is none to count thy minutes
d) Thou knowest how to wait

4) Who is narrator of the poem My Last Duchess?
a) the poet b) the emissary
c) the Duchess d) the Duke

5) What are things of beauty mentioned in the poem Ode to Beauty?
a) the son and moon b) young trees and streams
c) flowers d) All of these

6) In the poem Tree at My Window, at night _____ is lowered to keep out the wind.
a) combat b) lumper
c) sash d) calm

7) She performed _____ (adverbial)
a) wonder b) wonderfully
c) wondered d) wondering

8) Rewrite the given sentence into reported speech.
Riya said, "I love to read"
a) Riya said that she loves to read.
b) Riya said that she has love to read.
c) Riya said that she will love to read.
d) Riya requested that she will love to read

Q.2 Answer the following question in brief. (Any Four) **12**

a) According to Shastriji when does country progress?
b) What is the significance of wife's dream in God Sees the Truth but Waits?
c) What is the theme of the poem 'Endless Time'?
d) Why is Ode to Beauty considered to be a romantic poem?
e) How does the Duke reveal his role in the death of the duchess?
f) What is the main theme of Tree at My Window and its relation to the human experience?

Q.3 Write short notes on the following. (Any One) **10**

a) What is literacy skill? Write various types of literacy skills in your words.
b) Explain skills of civic literacy and health literacy in details

Q.4 What are life skills (FLIPS)? **10**

Seat No.	

Set | P

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
Network Security (ECS1602)

Day & Date: Wednesday, 29-04-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) _____ is the process of verifying the identity of a user.
   a) Authentication b) Identification
   c) Validation d) Verification

2) In symmetric encryption, _____ keys are used to encrypt and decrypt data.
   a) 1 b) 2
   c) 3 d) No key

3) Caesar Cipher is an example of _____.
   a) Poly-alphabetic Cipher b) Mono-alphabetic Cipher
   c) Multi-alphabetic Cipher d) Bi-alphabetic Cipher

4) _____ is not an alternative name for symmetric key cryptography.
   a) Secret key cryptography b) Public key cryptography
   c) Conventional encryption d) Private key cryptography

5) Which of the following algorithm does not belong to symmetric key ciphers?
   a) DES b) IDEA
   c) AES d) RSA

6) AES uses a _____ bit block size and a key size of _____ bits.
   a) 128; 128 and 256 b) 64; 128 and 192
   c) 256; 128, 192, and 256 d) 128; 128, 192, and 256

7) SSL primarily focuses on _____.
   a) Integrity and authenticity
   b) integrity and non-repudiation
   c) authenticity and privacy
   d) confidentiality and integrity

8) _____ of the following cannot be achieved by the digital signature in symmetric key encryption.
   a) Message authentication b) Data integrity
   b) Non-repudiation c) Confidentiality

9) _____ of the following is an objective of network security.
   a) Confidentiality b) Integrity
   c) Availability d) All of the above

10) _____ means that the data must arrive at the receiver exactly as they were sent.
   a) Message Integrity b) Confidentiality
   c) Authentication d) Non-repudiation

B) Fill in the blank. **06**

1) The full form of SSL is _____.
2) In RSA, $\Phi(n) =$ _____ in terms of p and q.
3) MD5 is widely used hash function for producing hash value of _____ bit.
4) S/MIME stands for _____.
5) The DES Algorithm Cipher System consists of _____rounds each with a round key.
6) In an _____ attack, Modification in information takes place.

Q.2 Solve any Eight of the following. **16**

a) What is substitution technique?
b) Define Authentication.
c) What is network security?
d) Write a full form of RSA and DES.
e) Define plaintext and ciphertext.
f) What is firewall?
g) Define Access Control.
h) Define intruders.
i) List types of security mechanisms.
j) What is Digital Signature?

Q.3 A) Attempt any Two of the following. **10**

1) Why use PGP? Explain in detail.
2) Explain types of security attack in detail.
3) Why use firewall? Explain types of firewall.

B) What is RSA? Explain RSA algorithm in detail. **06**

Q.4 A) Attempt any Two of the following. **08**

1) What is security? Explain network security services.
2) Discuss about IP security protocol.
3) Explain Blowfish algorithm in detail.

B) Explain MAC and HMAC in detail. **08**

Q.5 Attempt any Two of the following. **16**

a) What is cryptography? Explain types of cryptography in detail.
b) What is Message Digest? Explain SHA512 message digest technique.
c) Why use DES? Write a working process of DES algorithm.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
Data Warehousing and Data Mining (ECS1603)

Day & Date: Thursday, 30-04-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 A) Multiple choice questions. **10**

1) Data Reduction are used to ____.
   a) Removing missing values
   b) Reducing the volume of data while maintaining its integrity
   c) Combining data from multiple sources
   d) Transforming data into another format

2) The key characteristic of a Snowflake Schema is ____.
   a) Fact table is normalized
   b) Both fact and dimension tables are denormalized
   c) Only primary keys are stored
   d) Dimension tables are normalized

3) A real-world application of Descriptive Data Mining technique is ____.
   a) Identifying customer segments in marketing
   b) Predicting stock market trends
   c) Recommending products based on past purchases
   d) Forecasting weather conditions

4) The data in an OLTP system is best described as ____.
   a) Historical and summarized
   b) Current and detailed
   c) Aggregated and preprocessed
   d) Derived from external sources

5) The ____ is NOT a Descriptive Data Mining technique.
   a) Clustering b) Association Rule Mining
   c) Time Series Analysis d) Summarization

6) The "entropy" measure in a decision tree refers the ____.
   a) level of impurity in a dataset
   b) size of the dataset
   c) number of attributes in the dataset
   d) number of decision trees used

7) The ____ linkage criteria is NOT used in hierarchical clustering.
   a) Density Linkage b) Single Linkage
   c) Complete Linkage d) Average Linkage

8) The role of the kernel function in SVM is to ____.
   a) reduces the number of support vectors
   b) increases the number of data points
   c) removes outliers from the dataset
   d) maps data into a higher-dimensional space

9) Spatial data mining primarily deals with ____.
   a) Mining text-based documents
   b) Analyzing social media trends
   c) Extracting patterns from geographic or spatial data
   d) Mining transactional datasets

10) The ____ clustering techniques is NOT sensitive to the initial choice of centroids.
   a) DBSCAN b) CLARA
   c) Hierarchical Clustering d) K-Means

B) Fill in the blank. **06**

1) In a database with 1,000 transactions, {A, B} appears in 100 transactions, and {A} appears in 200 transactions then the confidence of the rule {A} → {B} is ____ %
2) The ____ parameter in DBSCAN specifies the least number of points needed to establish a dense cluster.
3) If the original data range is [20,100] and we apply Min-Max Normalization to scale it between [0,1] then the transformed value of 60 is ____.
4) The ____ algorithm is a known as "lazy learner" algorithm.
5) ____ clustering techniques starts with all records in one cluster and then try to split that cluster into small pieces.
6) The Naive Bayes classifier assumes that the features are ____ given the class label.

Q.2 Solve the following. (Any Eight) **16**

a) What is Time Variant in Data Warehouse Definition?
b) What is Datamart?
c) List out steps in KDD.
d) What is inconsistent data? Explain with example.
e) What is OLTP and OLAP?
f) What is Binning? Explain Equal-width partitioning binning with example.
g) Explain data mining issue related with user interaction.
h) What is Outlier Analysis? Explain with example.
i) What is apex cuboid?
j) What is Standardization? Explain Z-score normalization.

Q.3 A) Attempt the following. (Any Two) **10**

1) Explain difference between Star schema, Snowflake schema and Fact Constellation schema.
2) What is Association Rule Mining? Explain Multidimensional and Multilevel association with example.
3) Consider data points A1(2,10), A2(2,5), A3(8,4), B1(5,8), B2(7,5), B3(6,4), C1(1,2) and C2(4,9). Divide these data points into 3 cluster. Consider A1, B1 and C1 as initial centroid.

B) Explain different types of Metadata used in Data Warehouse. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) What is Data Mining? Explain architecture of Data Mining in detail.
2) Explain Spatial Data Mining and Web Data Mining with example.
3) Consider Actual values (x):=[3,5,2,7,4,6,8,5,9,10] and Predicted values (y)=[2.5,5.3,2.1,6.8,4.2,5.9,8.3,5.1,8.7,9.8] Calculate Root Mean Squared Error(RMSE).

B) Consider Following dataset **08**

Doc. Id	Keywords in the documents	Class
1	Love Happy Joy Joy Happy	Yes
2	Happy Love Kick Joy Happy	Yes
3	Love Move Joy Good	Yes
4	Love Happy Joy Love Pain	Yes
5	Joy Love Pain Kick Pain	No
6	Pain Pain Love Kick	No

predict class label for X=(Love Pain Joy Love Kick)

Q.5 Solve the following. (Any Two) **16**

a) How can we determine the best attribute for splitting in decision tree algorithms? Describe each technique with example.
b) Consider data points 18,22,25,42,27,43 and apply agglomerative hierarchical clustering algorithm and build dendrogram.
c) Explain Descriptive data mining and predictive data mining in detail.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
ASP.Net Core MVC (ECS1604)

Day & Date: Saturday, 02-05-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) The default file where we configure the hosting model is _____ file.
   a) Startup.cs b) Program.cs
   c) AppSettings.json d) launchSettings.json

2) The purpose of dependency injection in ASP.NET Core is _____.
   a) Inject JavaScript files
   b) Enable multi-threading
   c) Provide class instances via constructor
   d) Avoid using classes

3) The _____ NuGet package is essential for enabling MVC functionality in an ASP.NET Core application.
   a) Microsoft.EntityFrameworkCore
   b) System.Web.Mvc
   c) Microsoft.Mvc.Core
   d) Microsoft.AspNetCore.Mvc

4) In ASP.NET Core, services are typically registered using ____ in the Program.cs or Startup.cs file
   a) services.AddX() b) controller directly
   c) AddService d) In ViewStart.cshtml

5) The _____ attribute is used to prevent a property from being mapped to the database.
   a) [Ignore] b) [NotMapped]
   c) [Skip] d) [NoUsed]

6) The purpose of DbSet<TEntity> in a DbContext is _____.
   a) Handles routing
   b) Holds Razor Pages
   c) Represents a table in the database
   d) Generates JSON output

7) The _____ Razor file is executed first when rendering any Razor view.
   a) _Layout.cshtml b) Index.cshtml
   c) _ViewImports.cshtml d) _ViewStart.cshtml

8) The _____ command installs the EF Core package for SQL Server Database.
   a) install-efcore Microsoft.EntityFrameworkCore.SqlServer
   b) dotnet add package Microsoft.Entity FrameworkCore.SqlServer
   c) ef-core install sqlserver
   d) add efcore.sqlserver

9) The _____ HTML Helper creates a password input field in a Razor view.
   a) Html.PasswordField() b) Html.PasswordFor()
   c) Html.TextBoxFor() d) Html.PassworBox()

10) The default storage mechanism for session in ASP.NET Core is _____.
   a) In-Memory b) File
   c) SQL Server d) Redis

B) Fill in the blank. **06**

1) The _____ command creates a new ASP.NET Core MVC project using CLI.
2) The _____ type of relationship is modeled using a navigation property and foreign key in the same entity class.
3) The _____ file defines common using directives for Razor views.
4) To redirect to another action in ASP.NET Core, the _____ action result is used.
5) The static content such as CSS and JavaScript files in an ASP.NET Core project is placed in the _____ folder.
6) You can preserve TempData after it has been read by using the _____ method.

Q.2 Solve the following. (Any Eight) **16**

a) What is SSMS? Explain uses of SSMS.
b) Explain use of wwwroot Folder.
c) Explain Environment tag helper with example.
d) Explain how to uninstall client-side libraries that are installed in an ASP.NET Core MVC application.
e) Explain FromHeader with example.
f) Explain Remote Validation in an ASP.NET Core MVC application.
g) Explain with example Table and Column Attribute.
h) Write different commands to create ASP.Net web application using CLI.
i) Explain with example InverseProperty Attribute.
j) List the required packages to perform CRUD operations on a SQL Server database.

Q.3 A) Attempt the following. (Any Two) **10**

1) What is dependency injection? Explain with example.
2) What is connection string? Explain different location to store connection string with example.
3) What is routing? Explain Attribute routing in detail.

B) What is action result? Explain different types of action results used in asp.net core with example. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) What is strongly type view? Explain with example.
2) What is Tag Helper? Explain any 6 tag helper used in ASP.Net Core MVC application.
3) Explain Layout View in detail.

B) Write program to perform basic asthmatic operations-in ASP.Net Core MVC application. **08**

Q.5 Solve the following. (Any Two) **16**

a) Write down program to find total salary of specific department using stored procedure.
b) Explain features of asp.net core
c) What is session? Explain with example how to create sessions.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
React JS (ECS1605-A)

Day & Date: Monday, 04-05-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Which of the following is NOT a feature of ReactJS?
   a) Virtual DOM b) Two-way data binding
   c) JSX d) Component-based architecture

2) What does JSX stand for?
   a) JavaScript XML b) Java Syntax Extension
   c) JavaScript Example d) None of the above

3) Which method is used to update the state in a React class component?
   a) this.setState() b) this.updateState()
   c) this.changeState() d) this.stateChange()

4) What is the purpose of keys in React lists?
   a) To give unique identity to elements
   b) To style list items
   c) To sort the list
   d) To remove duplicates

5) Which hook is used for side effects in functional components?
   a) useState b) useEffect
   c) useRef d) useContext

6) What does Redux use to describe “changes” in the application?
   a) Store b) Actions
   c) Reducers d) Dispatcher

7) In React, props are used to: ____.
   a) Store internal data
   b) Pass data from parent to child components
   c) Handle component state
   d) Manage events

8) Which of the following is NOT a lifecycle method in React class components?
   a) componentDidMount
   b) Render
   c) useEffect
   d) componentWillUnmount

9) What does NPM stand for?
   a) Node Package Manager
   b) Node Programming Module
   c) Network Package Manager
   d) None of the above

10) Which syntax is correct for creating a functional React component?
   a) function MyComponent() { return Hello ; }
   b) class MyComponent extends React.Component {}
   c) let component = () => Hello ;
   d) Both (a) and (c)

B) Fill in the blank/Definition/ One-word answer. **06**

1) The function of _____in React is to pass data from one component to another.
2) JSX expressions must be enclosed within _____ braces.
3) The operator commonly used in React for conditional rendering besides if-else is the _____ operator.
4) The default values for input elements can be set using the _____ attribute.
5) React Router's component used to define the path and corresponding component is called _____.
6) The hook used for managing references to DOM elements or values is_____.

Q.2 Solve the following. (Any Eight) **16**

a) Write a simple React functional component that returns a <h1> tag with your name.
b) Explain the difference between state and props with examples.
c) Describe the lifecycle method componentDidMount.
d) Write JSX to render a list of numbers from an array using the map() function.
e) What are the advantages of using JSX in React?
f) Demonstrate how to use the useState hook in a functional component.
g) Explain event handling in React with an example.
h) Describe the purpose and basic usage of React Context API.
i) What is Redux and how does it help in state management?
j) How do you prevent a React component from rendering? Provide an example.

Q.3 A) Attempt the following. (Any Two) **10**

1) Explain the difference between Functional and Class Components in React. Provide code snippets.
2) Write a React component that uses conditional rendering to display Logged In" or "Logged Out" based on a state variable.
3) Describe the steps to set up a React development environment including Node and NPM.

B) Write a short note on React Hooks and their significance. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Describe the role of keys in React lists and why they are important.
2) Explain the concept of “lifting state up” in React with an example.
3) What are synthetic events in React? How do they differ from native events?

B) Explain how routing works in React using React Router. Provide an example with nested routes. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Describe Redux architecture. Explain the roles of Actions, Reducers, and Store with examples.

b) Create a React component that demonstrates controlled form inputs with validation.

c) Explain the useEffect hook with an example showing how to fetch data on component mount.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
Compiler Construction (ECS1605-B)

Day & Date: Monday, 04-05-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat, labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Type checking is normally done during _____ phase.
   a) Lexical analysis b) Syntax analysis
   c) Syntax-directed translation d) Code optimization

2) The _____ parser uses a reduction process.
   a) Top-down parser b) Bottom-up Parser
   c) Either a or b d) Both a and b

3) The output of a lexical analyser is _____.
   a) Machine code b) Intermediate code
   c) A stream of tokens d) A parse tree

4) The graph that shows basic blocks and their successor relationship is called _____.
   a) DAG b) Flow graph
   c) control graph d) Hamiltonian graph

5) The canonical parser is more powerful in LR parser.
   a) True b) False

6) Shift reduce parsers are _____.
   a) Top-down parser b) Bottom-up parser
   c) May be top-down or bottom up d) None of the above

7) In the run time environment, each node represents _____ of a procedure.
   a) Definition b) Declaration
   c) Activation d) All of the above

8) In _____ the parser discards enough tokens to reach a decent state on the declaration of errors.
   a) Panic mode recovery b) parser level recovery
   c) Both a and b d) None of these

9) A computer uses a _____ to keep track of scope and binding information about names.
   a) phases
   b) symbol table
   c) heap allocation
   d) None of these

10) _____ is the activity of filling up unspecified information of labels using appropriate semantic actions during the code generation process.
   a) dangling reference
   b) symbol table
   c) backtracking
   d) backpatching

B) Fill in the blank. **06**

1) The output of a syntax analyser is _____.
2) The compiler process can be considered as a series of sub-processes called _____.
3) The activation records are represented by _____.
4) The _____ is an optional phase of the compiler.
5) In the run-time environment, each node represents _____ of a procedure.
6) If optimization is over large program segments, then it is called _____ optimization.

Q.2 Solve the following. (Any Eight) **16**

a) Define:
   i) Language
   ii) Pattern

b) Write a short note on bootstrapping.

c) What are the difficulties with top-down parsing?

d) What are the actions available in the shift-reduce parser?

e) Give the types of errors handled by the syntax analyser.

f) What is the difference between CLR and LALR?

g) Explain issues in register allocation.

h) Why there is a need for code optimization?

i) Define Short Circuit Code.

j) Give a general form of three-address code with an example.

Q.3 A) Attempt the following. (Any Two) **10**

1) How to specify and recognize the tokens?
2) Explain compiler construction tools in detail.
3) What are the different types of three-address statements?

B) Find out triple, quadruple, and indirect triple for the following: **06**

$a := b * - c + b * - c * d;$

Q.4 A) Attempt the following. (Any Two) **08**

1) Why symbol table is used? Explain the symbol table with its operation.
2) Why there is need of storage allocation? Explain storage allocation strategies in detail.
3) Find first and follow of following grammar:
   $E \to E + T|T, \quad T \to T^*F|F, F \to (E)|id$

B) Construct annotated parse tree for $5^*3 + 4$n using the following grammar rules: **08**

PRODUCTION		SEMANTIC RULES
1)	$L \to E\ n$	$L.val = E.val$
2)	$E \to E_1 + T$	$E.val = E_1.val + T.val$
3)	$E \to T$	$E.val = T.val$
4)	$T \to T_1 * F$	$T.val = T_1.val \times F.val$
5)	$T \to F$	$T.val = F.val$
6)	$F \to (E)$	$F.val = E.val$
7)	$F \to$ digit	$F.val =$ digit.lexval

Q.5 Attempt the following. (Any Two) **16**

a) What is code optimization? Explain code optimization techniques.

b) Construct SLR(1) parsing table for the following grammar:
$E \to E + T \mid T, T \to T^*F \mid F, F \to a \mid b$

c) What is a Parser? Explain a bottom-up parser with its types.

Seat No.		Set	P

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
Internet of things (ECS1605-C)

Day & Date: Monday, 04-05-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Which of the following is not an element of an IoT ecosystem?
   a) Sensors b) Microcontrollers
   c) Web Browsers d) Cloud Services

2) IoT is a part of which system type?
   a) Cyber-Physical Systems b) Operating Systems
   c) Cloud Systems d) Mobile Systems

3) Which protocol is used in industrial control systems?
   a) Modbus b) SMTP
   c) HTTP d) POP3

4) KNX protocol is mainly used in: ____.
   a) Home automation b) Cloud computing
   c) Mobile applications d) Robotics

5) Which of the following is an IoT application in healthcare?
   a) Smart watches b) Automatic doors
   c) Voice assistant d) Virtual keyboard

6) Which computing model connects IoT with cloud?
   a) Cloud computing b) Fog computing
   c) Edge computing d) All of these

7) Raspberry Pi runs on _____.
   a) Linux OS b) Android OS
   c) Windows OS d) iOS

8) Raspberry Pi can be used as _____.
   a) Web server b) Sensor node
   c) Media center d) All of these

9) Which algorithm is important for IoT data security?
   a) AES b) SHA
   c) RSA d) All of these

10) Which of the following is used for IoT prototyping?
   a) Arduino b) Raspberry Pi
   c) Both a) and b) d) None

B) Fill in the blank/ Definition/One sentence answer/ One word answer/ Give the name/ Predict the product etc. **06**

1) IoT stands for_____.
2) _____ are devices that detect changes in the environment.
3) _____ act as the brain of IoT devices.
4) WSN stands for _____.
5) Security in the cloud includes _____ And _____.
6) _____ is commonly used for programming Raspberry Pi.

Q.2 Solve the following. (Any Eight) **16**

a) Define the Internet of Things (IoT).
b) Define microcontroller.
c) What is Zigbee protocol?
d) Define IoT middleware.
e) List the advantages of Modbus.
f) Define ARM microcontroller.
g) List Advantages of PWM used in IOT?
h) Write two features of Arduino.
i) Define Smart Object in IoT.
j) What are IoT challenges?

Q.3 A) Attempt the following. (Any Two) **10**

1) Describe the elements of the IoT ecosystem with examples.
2) Explain fog computing in detail.
3) Explain the architecture of Arduino.

B) Write a note on sensor interfacing in IoT. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Explain the Modbus protocol and its applications.
2) Explain health care and water quality application of IOT.
3) Explain protocol standardization efforts in IoT.

B) Explain the elements of an IoT ecosystem and its major characteristics. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Explain the role of security in IoT protocol design and implementation.
b) Describe the IoT architecture and its layers in detail.
c) Explain M2M and WSN protocols in IoT.

Seat No.	

Set **P**

B.Sc. (E.C.S.) (Semester - VI) (New) (CBCS) Examination: March/April – 2026
Mobile Application Development (Special Paper-XI) (ECS0606)

Day & Date: Tuesday, 05-05-2026 Max. Marks: 80
Time: 12:00 PM To 03:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed

Q.1 A) Multiple choice questions. **10**

1) Android is based on _____ of the following.
   a) Windows b) Linux
   c) iOS d) Symbian

2) _____ virtual machine is used by Android to run apps.
   a) JVM b) ART
   c) Dalvik d) AVM

3) In Android, Activities, Services, Broadcast Receivers, and Content Providers are part of:
   a) Application Components b) Application Framework
   c) Libraries d) Linux Kernel

4) _____ component in Android manages access to a structured set of data (like contacts, media etc.)?
   a) Intent b) Service
   c) Content Provider d) Activity

5) Android applications are packaged into files with extension _____.
   a) .exe b) .apk
   c) .app d) .jar

6) _____ Android component is used to navigate from one screen to another or between apps.
   a) View b) Intent
   c) Service d) Activity Manager

7) The Android SDK includes _____.
   a) Emulator b) Debugging tools
   c) Libraries d) All of these

8) The Android emulator is used for _____.
   a) Running apps on real hardware only
   b) Debugging apps without a device
   c) Publishing apps directly
   d) Encrypting APK files

9) In Android, every element of the screen (button, text box, image, etc.) is called a _____.
   a) Activity b) View
   c) Layout d) Widget

10) _____ layout arranges its children in a single row or column?
   a) FrameLayout b) LinearLayout
   c) RelativeLayout d) ConstraintLayout

B) Fill in the blanks. **06**

1) _____ Android XML file defines the user interface of an Activity.
2) _____ database is natively supported by Android.
3) _____ manager in the Android framework manages the life cycle of applications.
4) Android SDK stands for _____.
5) ADB stands for _____.
6) A group of Views in Android is called a _____.

Q.2 Solve the following. (Any Eight) **16**

a) Define an Activity in Android.
b) Define RelativeLayout.
c) What is the role of Broadcast Receivers?
d) Write any two features of Android.
e) Define Toast in Android.
f) What are fragments in Android?
g) What is the role of the Application Framework layer in Android architecture?
h) What is a URI in Content Providers?
i) What is the purpose of findViewById() method?
j) What are the dialog boxes supported in android?

Q.3 A) Attempt the following. (Any Two) **10**

1) What is Intent. Explain the types of Intent.
2) Explain the strings.xml file in android.
3) Design a UI Layout and Write an Activity to handle the onClick() event.

B) Write a note on Android Architecture. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Write the difference between Activities and Services in Android.
2) Explain Linear Layout component with its attributes.
3) Explain AndroidManifest.xml file.

B) Explain Buttons, Check Boxes and Radio Groups UI Components in Android. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Write an android application to demonstrate Activity Life cycle.

b) Explain the Broadcast Receivers component with example.

c) What is Android SDK? Explain the components of Android SDK.