# BCS–0111

## Practice Question Paper

### BCS-0111 : COMPUTER BASICS AND PC SOFTWARE

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

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***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

1. (a) Do the following conversions : 10

(i) (124.5) Decimal to Binary

(ii) (110101101010) Binary to Hexadecimal

(iii) (CBA) Hexadecimal to Binary

(iv) (574) Octal to Decimal

(v) (10101) Binary to Decimal

**P. T. O.**

(a) Explain the various types of computers on the basis of the technology used. 4

(b) Explain the working of the following EXCEL functions :

COUNTIF, LEFT, HLOOKUP, MATCH, CONCATENATE, NOW, SUM 6

(c) What are the functions of various operational units of a computer system? What is von Neumann Architecture? How can you relate von Neumann architecture to an actual computer? Explain with the help of an example configuration. 7

(d) What are Malwares ? Explain any three Malwares, in brief, with the help of an example of each. 7

(f) What is Hard Disk Drive ? Describe the Storage Organization of a HDD with the help of a diagram. 6

2. (a) What is Internet ? Describe the TCP/IP 6

Model.

(b) What is Mail Merge ? Explain the various steps of mail merge with the help of an example. 8

(c) What is a flow chart ? Draw a flow chart to find the maximum of three given natural numbers. 6

3. (a) What is application software ? How is application software different from system software ? List the names of two 6

(b) Discuss the following in brief : 8

(i) Assembler

(ii) Editor

(iii) Interpreter

(iv) Compiler

(c) What is the role of Operating System of acomputer ? Define the term "Kernel" of an operating system. What are the uses of GUI and Input/Output control system for an operating system user ? 6

**P. T. O.**

4. (a) Describe the structured and modular design paradigm with the help of a diagram and pseudo code. 8

(b) Describe each of the following communication modes, bringing out the similarities and differences among them : 8

(i) Broadcast

(ii) Simplex

(iii) Half-duplex

(iv)Duplex

(c)What is the OSI model ? List the layers of the model from the lowest layer upwards. 4

5.(a)Explain the role of the following network devices : 8

(i) Network Interface Card

(ii) Modem

(iii) Hub

(iv)Router

(b)What are the advantages and disadvantages of using Inkjet printers 6

(c) Identify the Net ID and Device ID for the following IP address

and Subnet mask pairs : 6

192.168.5.97 and 255·255.255.0

10.10.13.10 and 255.255.0.0

**P. T. O.**

# BACHELOR OF COMPUTER APPLICATIONS
## (BCA–NEW)
## Practice Question Paper
## BCS-12: BASIC MATHEMATICS

*Maximum Marks : 100*

***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks.*
*Attempt any* ***three*** *questions from the rest.*

1. (a) Using determinants, find the area of the triangle whose vertices are A(1, 4) , B(2,3) and C(–5,–3). 5

   (b) Solve the following system of linear equations using Cramer's rule: $x + 2y - z = -1$, $3x + 8y + 2z = 28$, $4x + 9y + z = 14$ 5

   (c) Use the principle of mathematical induction to show that $2 + 2^2 + \ldots\ldots\ldots\ldots + 2^n = 2^{n+1} - 2$ for every natural number n. 5

   (d) Find $(\sqrt{3} + i)^3$ by using De Moivre's theorem. 5

   (e) Find the sum to n terms of the series $0.6 + 0.66 + 0.666 + \ldots\ldots$ 5

   (f) If 1, ω, $\omega^2$ are cube root of unity, show that $(2-\omega)(2-\omega^2)(2-\omega^{19})(2-\omega^{23}) = 49$. 5

   (g) Reduce the matrix A $\begin{bmatrix} 5 & 3 & 8 \\ 0 & 1 & 1 \\ 1 & -1 & 0 \end{bmatrix}$ to normal form by elementary operations and hence find its rank. 5

   (h) If α, β are the roots of the equation $3x2 - 4x + 1 = 0$, form an equation whose roots are $\alpha^2/\beta$, $\beta^2/\alpha$. 5

2. (a) Draw the graph of the solution set of the following inequalities on the same graph. $2x + y \geq 8$, $x + 2y \geq 8$ and $x + y \leq 6$. 5

   (b) If $y = \ln\left[e^x \left(\frac{x-2}{x+2}\right)^{3/4}\right]$, find $\frac{dy}{dx}$. 5

   (c) Evaluate $\lim_{x\to 0} \frac{\sqrt{1+2x} - \sqrt{1-2x}}{x}$. 5

   (d) Find the local (relative) extrema of: $f(x) = \frac{3}{4}x^4 - 8x^3 + \frac{45}{2}x^2 + 105$ 5

3. (a) Evaluate $\int \frac{dx}{\sqrt{x} + x}$ 5

   (b) Find the length of the curve $y = 2$ from point (1,2) to (4,16). 5

(c) Prove that the three medians of a triangle meet at a point called the centroid of the triangle which divides each of the medians in the ratio 2:1. 5

(d) Show that $|\vec{a}|\vec{b} + |\vec{b}|\vec{a}$ is perpendicular to $|\vec{a}|\vec{b} - |\vec{b}|\vec{a}$, for any two non-zero vectors. 5

4. (a) Find the shortest distance between the lines whose vector equations are: 5

$\vec{r} = (1+\lambda)\hat{\imath} - (2-\lambda)\hat{\jmath} + (1+\lambda)\hat{k}$ and $\vec{r} = 2(1+\mu)\hat{\imath} - (1-\mu)\hat{\jmath} + (-1+2\mu)\hat{k}$

(b)A company wishes to invest at most \$12000 in project A and project B. Company must invest at least \$ 2,000 in project A and at least \$ 4,000 in project B. If project A gives return of 8% and project B gives return of 10%, find how much money is to be invested in the two projects to maximize the return. 5

(c) Find the inverse of $A = \begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$ and verify that $A^{-1}A = I_3$. 5

(d) Reduce the matrix $\begin{bmatrix} 0 & 3 & -3 \\ 2 & -4 & 8 \\ -1 & 3 & -3 \end{bmatrix}$ to I3. 5

5. (a) Solve the system of linear homogeneous equation : $2x - y + 3z = 0, x + 5y - 7z = 0, x - 6y + 10z = 0$. 5

(b)Use the principle of mathematical induction to prove that for every natural number n. 5

(c) Find the 10th term of the H.P. 1/3, 1/7, 1/11, 1/15… 5

(d) Find the smallest positive integer for which $\left(\frac{1+i}{1-i}\right)^n = 1$ 5

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# BACHELOR OF COMPUTER APPLICATIONS
## (BCA–NEW)
## Practice Question Paper
## BCS-12: BASIC MATHEMATICS

*Maximum Marks: 100*

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***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

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1. (a) Show that $\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 2 \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$

   (b) If $x = a + b$, $y = a\omega + b\omega^2$, $z = a\omega^2 + b\omega$ (where $\omega$ is a cube root of unity and $\omega \neq 1$), show that $xyz = a^3 + b^3$.

   (c) If z s a complex number such that $|z - 2i| = |z + 2i|$, show that Im(z) =0.

   (d) Find the smallest positive integer for which $\left(\frac{1+i}{1-i}\right)^n = 1$

   (e) Find the sum of all the integers between 100 and 1000 which are divisible by 7.

   (f) If the sum of the first n terms of an A.P. is given by $S_n = 2n^2 + 5n$, Find the nth term of the A.P.

   (g) Show that $2^{3n} - 1$ is divisible by 7 for every natural number n.

   (h) Solve the equation $2x^3 - 15x^4 + 37x - 30 = 0$. If the roots of the equation are in A. P.

2. (a) Solve the inequality $\frac{5}{|x-3|} < 7$.

   (b) If $y = 1 + \ln(x + \sqrt{x^2+1})$, prove that

   $$(x^2+1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0.$$

   (c)Find the points of discontinuity of the following function:

   $$f(x) = \begin{cases} x^2, & x > 0 \\ x+3, & x \leq 0 \end{cases}$$

   (d) A young child is flying kite which is at a height of 50 m. The wind is carrying the kite horizontally away from the child at a speed of 6.5 m/s. How fast must the kite string be let out when the string is 130 m?

3. (a) Evaluate the integral

   $$I = \int \frac{x^2}{(x+1)^3}\,dx$$

   (b) Find the area bounded by the curves $y = x^2$ and $y^2 = x$. Also draw graph for the same.

   (c) Write the direction ratios of the vector $\vec{r} = 2\,\hat{\imath} - \hat{\jmath} - \hat{k}$ and hence calculate its direction cosines.

   (d) If $\vec{a}$, $\vec{b}$, $\vec{c}$ are coplanar then prove that $\vec{a}+\vec{b}$, $\vec{b}+\vec{c}$ and $\vec{c}+\vec{a}$ are also coplanar.

4. (a)For any vectors $\vec{a}$ and $\vec{b}$, prove the triangle inequality $|\vec{a} + \vec{b}| \leq |\vec{a}| + \overrightarrow{|b|}$.

(b) Find the Vector and Cartesian equation of the line passing through the points (–2, 0, 3) and (3,5, –2).

(c) Two tailors, A and B, earn ₹150 and ₹200 per day respectively. A can stitch 6 shirts and 4 pants while B can stitch 10 shirts and 4 pants per day. How many days shall each work if it is desired to produce (at least) 60 shirts and 32 pants at a minimum labor cost? Also calculate the least cost.

(d) Reduce the matrix $\begin{bmatrix} 0 & 3 & -3 \\ 2 & -4 & 8 \\ -1 & 3 & -3 \end{bmatrix}$ to I3.

5. (a) Solve the system of linear homogeneous equation : $2x - y + 3z = 0$, $x + 5y - 7z = 0$, $x - 6y + 10z = 0$.

(b)Use the principle of mathematical induction to prove that for every natural number n.

(c) Find the 10th term of the H.P.

1/3, 1/7, 1/11, 1/15, .....

(d) Solve the following system of linear equations by using matrix inverse:

$3x + 4y + 7z = -2$

$2x - y + 3z = 6$

$2x + 2y - 3z = 0$

and hence, obtain the value of $3x - 2y + z$.

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**BDP / BCA / BTS**
**Practice-Paper**
**FEG-2 : FOUNDATION COURSE IN ENGLISH-2**

**Time : 2 Hours** **Maximum Marks : 50**

**Note : Answer all questions.**

**1. Write a composition in about *350* words on any *one* of the following : 20**

(a) The importance of following traffic rules
(b) What I admire most about my parents
(c) Our responsibilities towards the elderly
(d) The role of hobbies in shaping a child's

**2. Write a paragraph of about one of the following : 10**

(a) Virtual friends
(b) A trip made with family
(c) My mother
(d) I wish I could be .....

**3. Write a letter to the civic authorities describing the menace of stray dogs in your colony. 10**

OR

**Write a letter to the head of your institution requesting permission to organize a half marathon to spread the message of keeping fit.**

**4. Summarize the following passage in not more than one-third of original. Give it a suitable title. 10**

Space exploration is the use of astronomy and space technology to explore outer space. While the study of space is carried out mainly by astronomers with telescopes, its physical exploration though is conducted both by unmanned robotic space probes and human spaceflight. While the observation of objects in space, known as astronomy, predates reliable recorded history, it was the development of large and relatively efficient

rockets during the mid-twentieth century that allowed physical rationales for exploring space include advancing International Space Station (ISS). scientific research, national prestige, uniting different nations, ensuring the future survival of humanity, and developing military and strategic advantages against other countries. Space exploration has often been used as a proxy competition for geopolitical rivalries such as the Cold War. The early era of space exploration was driven by a "Space Race" between the Soviet Union and the United States. The launch of the first human-made object to orbit Earth, the Soviet Union's Sputnik 1, on 4th October, 1957, and the first Moon landing by the American Apollo 11 mission on 20th July, 1969 are often taken as landmarks for this initial period. The Soviet space programme achieved many of the first milestones, including the first living being in orbit in 1957, the first human spaceflight (Yuri Gagarin aboard Vostok 1) in 1961, the first spacewalk (by Alexei Leonov) on 18th March, 1965, the first automatic landing on another celestial body in 1966, and the launch of the first space station (Salyut 1) in 1971. After the first 20 years of exploration, focus shifted from one-off flights to renewable hardware, such as the Space Shuttle programme, and from competition to cooperation as with the

The first telescope was said to be invented in 1608 in the Netherlands by an eyeglass-maker named Hans Lippershey. The Orbiting Astronomical Observatory 2 was the first space telescope launched on 7th December, 1968. As of 2nd February, 2019, there were 3,891 confirmed exoplanets discovered. The Milky Way is estimated to contain 100 – 400 billion stars and more than 100 billion planets. There are at least 2 trillion galaxies in the observable universe. GN-z11 is the most distant known object from the Earth, reported as 32 billion light-years away.

# Computer Organisation Practice Question Bank

Practice Questions from MCS-202 Papers.

## SECTION 1 : Number System and Conversions

1. $(49.25)_{10}$ to binary and hexadecimal.

2. $(1100.1101)_2$ to decimal and hexadecimal.

3. $(1010111.01)_2$ to decimal and hexadecimal.

4. $(389)_{10}$ to hexadecimal.

5. $(FFA)_{16}$ to octal.

6. $(2357)_8$ to hexadecimal.

7. $(AAA)_{16}$ to decimal.

8. $(235)_8$ to decimal.

9. $(384)_{10}$ to binary.

10. $(873)_{10}$ to hexadecimal.

11. $(670)_8$ to decimal.

## SECTION 2 : Boolean Algebra and K-Map

1. Simplify $F(A,B,C,D)=\Sigma(0,1,3,5,8,10,13)$ using K-map.

2. Simplify $F(A,B,C)=\Sigma(0,1,3,4,5,6)$ using K-map and draw NAND implementation.

3. Simplify $F(A,B,C,D)=\Sigma(0,3,5,7,9,10,11,12,15)$ using K-map.

4. Simplify $F=\Sigma(0,2,4,6,8,10)$ using K-map and draw logic diagram.

## SECTION 3 : Computer Architecture and Memory

1. Explain Von Neumann Architecture with diagram.

2. Differentiate between Von Neumann and Harvard architecture.

3. Explain memory hierarchy with diagram.

4. Explain associative cache mapping with example.

5. Explain set-associative cache mapping with example.

6. Explain cache memory and need of cache mapping.

7. Differentiate between SRAM and DRAM.

8. Explain RAID and reliability techniques.

9. Explain SSD and compare with HDD.

10. Explain seek time, latency time and hit ratio.

## SECTION 4 : 8086 Microprocessor and Assembly Language

1. Explain components of 8086 microprocessor with diagram.

2. Explain utility of segment registers in 8086.

3. Explain interrupt 21h with example.

4. Write ALP to convert binary digit to ASCII.

5. Write ALP to add two byte numbers stored in memory.

6. Write ALP to count characters in a string.

7. Write ALP to convert lowercase string to uppercase.

8. Write ALP to find smallest number in array.

9. Differentiate PUSH and PUSHF instructions.

10. Differentiate AAA and DAA instructions.

## SECTION 5 : I/O and DMA

1. Explain DMA and its importance.

2. Differentiate DMA and programmed I/O.

3. Explain interrupt driven I/O with example.

4. Explain programmed I/O and compare with interrupt driven I/O.

5. Explain hardware and software interrupts.

## SECTION 6 : Flip-Flops and Sequential Circuits

1. Explain JK flip-flop with characteristic and excitation tables.

2. Explain D flip-flop with excitation table.

3. Explain S-R flip-flop with characteristic and excitation table.

4. Explain Master-Slave flip-flop.

5. Draw truth table and logic diagram of 4x1 multiplexer.

6. Explain 3x1 multiplexer with truth table.

7. Draw truth table for 8x3 encoder.

8. Draw synchronous counter using JK flip-flops.

## SECTION 7 : Addressing Modes and Micro-Operations

1. Explain indexed addressing mode.

2. Explain base register addressing mode.

3. Explain relative addressing mode.

4. Explain register and indirect addressing modes.

5. Explain arithmetic and logic micro-operations.

6. Explain instruction fetch micro-operations.

## SECTION 8 : RISC and Pipeline

1. Explain RISC architecture and large register file.

2. Explain overlapped register window in RISC.

3. Explain instruction pipeline.

4. Explain multiprocessor.

5. Explain multiport memory.

## SECTION 9 : Numerical Problems

1. Add -35 and -31 using signed 1's complement.

2. Add -35 and -31 using signed 2's complement.

3. Add -28 and +127 using signed 2's complement.

4. Subtract -56 from -77 using signed 2's complement.

5. Add +28 and +100 using signed 2's complement.

## Short Note:-

1. What is opcode?

2. What is micro-operation?

3. What is stack organization?

4. Difference between compiler and assembler.

5. What is instruction format?

# Practice Question Paper

## MCS-203 : OPERATING SYSTEMS

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *Question No.* ***1*** *compulsory. Attempt any* ***three*** *questions from the rest.*

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1. (a) For the following given 5 processes arrived at the same time in the order with the length of their CPU time in milliseconds :

| Process | Processing Time |
|---|---|
| $P_1$ | 7 |
| $P_2$ | 6 |
| $P_3$ | 9 |
| $P_4$ | 4 |
| $P_5$ | 3 |

calculate the turnaround time, average

waiting time, throughput and processor utilization for FCFS, SJF and RR (quantum = 2) scheduling algorithms.10

(b) Define paging technique. With the help of a diagram, explain the principles of its operation. Also, discuss the hardware support required for paging. 10

(c) Write and explain dining philosopher's problem. Also, provide the solution for the problem using semaphores. 10

(d) With the help of a diagram, explain the layered architecture of iOS. 10

2. (a) Discuss the file management and security features in Android operating system. 10

(b) Elucidate the general design issues for

a mobile operating system in detail. 10

3. (a) List and explain the techniques available for synchronization in multiprocessors. 10

(b) Write and explain Lamport's Bakery Algorithm for mutual exclusion in distributed systems. 10

4. (a) Explain Virtual Memory and its principle of operation, elaborating the virtual to physical address mapping. 10

(b) In context to multiprocessor operating systems, explain the following types : 10

(i) Separate supervisor

(ii) Master-Slave

5. Write short notes on the following : 4×5=20

   (a) Demand segmentation

   (b) Deadlock detection and Recovery

   (c) Security features in LINUX

   (d) Rule-based access control and role-based access control security models

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# Practice Question Paper

**MCS–201 : PROGRAMMING IN C AND PYTHON**

*Maximum Marks : 100*

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***Note :*** *Question No.* ***1*** *is compulsory. Attempt any* ***three*** *questions from the rest.*

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1. (a) Draw flowchart and write algorithm to print factorial of a number entered by the user. 5

(b) Compare overloading and overriding in Python. Give suitable example code for each. 5

(c) Explain the concept of call by reference, with suitable code in C. Give advantage and disadvantage of call by reference. 5

(d) Explain Lambda functions, with the help of a suitable code in Python. 5

(e) What are generators in Python? Compare generators and lists. Also discuss utility of generators in Python. 5

(f) Write a program in C to calculate the product of three matrices. Support your code with suitable comments. 5

(g) What does map( ) function do ? Write a program in Python to print the square of the numbers present in the list, by using map( ) function. 5

(h) Differentiate between Structure and Union in C. Give suitable example code segment for each. 5

2. (a) Compare any two of the following (give suitable C code for each) :

   (i) Buffered I/O and Unbuffered I/O

   (ii) Break and Continue Statement

   (iii) Structure and Union 10

(b) Write Python code to perform the following : 10

   (i) Copy a file first.txt to second.txt

   (ii) Reading a file

   (iii) Writing to a file

   (iv) Appending content to a file

3. (a) What are Cursor Objects ? Briefly discuss the utility of cursor objects. Write Python code for a cursor to execute the SQL query, to print the

version of database. Support your program with suitable comments. 10

(b) Discuss the following terms in context of python. (Give example for each) : 10

(i) Framework

(ii) Library

(iii) Package

(iv) Module

Also, give relation between them.

4. (a) Write a program in C to generate the following pattern: 10

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

(b) Write short notes on the following (give utility of each) : 10

(i) Storage classes in C

(ii) Decorators in Python

(iii) Cursor objects

(iv) Functions and its types

5. Differentiate between the following : 4×5=20

(i) Co-routines and Subroutines

(ii) Mutable and Immutable data types

(iii) Random Access and Sequential Access of files

(iv) Overloading and Overriding

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# Practice Question Paper

## MCS–208: DATA STRUCTURE AND ALGORITHMS

*Maximum Marks: 100*

***Note:*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

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1. (a) What are Arrays? Write an algorithm to multiply two matrices. **10**

   (b) Write an algorithm for Bubble Sort. Sort the following set of data in ascending order using Bubble Sort. Show all steps of the application of the algorithm: **10**

   150, 30, 60, 10, 180, 85

   (c) Convert the following expression to postfix: **10**

   a b*c d / e*f

   (d) What is meant by worst-case time complexity and best-case time complexity? Explain with an example. **10**

2. (a) What is a Stack? Write an algorithm for the implementation of a Stack. **10**

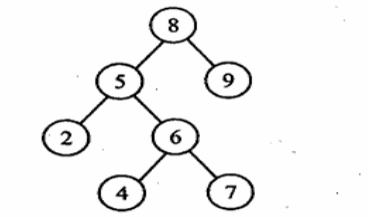
   (b) What is a Tree? How does it differ from a Binary Tree? **10**

3. (a) What is Breadth-First Search? How does it differ from Depth-First Search? **10**

   (b) What are circular linked lists? Write an algorithm for the insertion of an element into a circular linked list. **10**

4. (a) Write pre-order and post-order traversal of the tree **10**

given below:

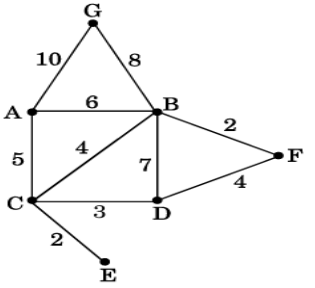



**10**

(b) What are AA-trees? Explain how they are different from Red-Black Trees?

5. (a)Write push and pop functions for a stack data structure using a linked list. **10**

(b) Find the minimum cost spanning tree for the following graph using Prim's algorithm: **10**




Show all the intermediate steps of the process.

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# Practical Question Paper

## MCS-207 : DATABASE MANAGEMENT SYSTEMS

*Time : 3 Hours* *Maximum Marks : 100*

***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from Question Nos.* ***2*** *to* ***5****.*

1. (a) A departmental store keeps the following information about its items and customers :

   - The unique item identifier of each item
   - The name of each item
   - The price per unit of each item
   - The number of units of each item in stock
   - A unique customer number for each customer
   - The phone number and address of

each customer

- The list of items purchased by each customer along with quantity

Perform the following tasks for the description given above :

(i) List all the entities. 2

(ii) List the attributes of the entities. 2

(iii) Identify relationships between/ among entities. 2

(iv) List the primary key and foreign key constraints. 2

(v) Draw the E-R diagram. 2

(vi) Convert E-R diagram to relations. 2

(b) Consider the following relations, where key attributes are underlined : 8

Member (memberID, name, phone)

Library (book_id, Title, first_author)

Issue (memberID, book_id, date_of_issue)

Write the SQL commands for the following queries on the relations given above :

(i) Find the phone number of member(s) whose name is 'Rakesh Jain'.

(ii) Find the title of all the books issued to a member whose ID is 'M001'.

(iii) Count the number of books issued to each member.

(iv) List all the books in the alphabetical order of book title.

(c) Consider the following three transactions : 5+5=10

| $T_A$ | $T_B$ | $T_C$ |
|---|---|---|
| READ A<br>A = A + 100<br>WRITE A | READ B<br>B = B – 100<br>WRITE B | READ A<br>A = A + 200<br>WRITE A |

Assume that the three transactions $T_A$,

$T_B$ and $T_C$ are executed concurrently. Show the execution schedules of these transactions for the following :

(i) The schedule is serializable with transaction sequence $T_A$, $T_C$ and $T_B$.

(ii) The schedule which results in lost update problem.

(d) What is data mining? How is data mining useful for an organization? How is data mining different from knowledge discovery? 4

(e) Explain the following terms in the context of advanced database management systems : 6

(i) Complex data types

(ii) ETL process of data warehouse

(iii) Geographic information systems

2. (a) Briefly explain the roles of Database Manager in the context of physical DBMS architecture. 5

(b) Explain the following terms in the context of Relations : 5

(i) Domain

(ii) Tuple

(iii) Candidate keys

(iv) Entity Integrity constraint

(v) Domain constraints

(c) What is the purpose of Data Definition Language (DDL) in SQL ? Explain the CREATE TABLE command of SQL with the help of an example. 5

(d) What is hash file organisation ? Explain with the help of a diagram. 5

3. (a) What is Functional Dependency? Explain with the help of an example. Explain the desirable properties of decomposition with the help of an example. 7

(b) What is Multi-Valued Dependency

(MVD) ? Explain with the help of an example. Explain how MVDs can be used to decompose a relation to 4NF with the help of an example. 7

(c) Explain the self-join and outer join. 6

4. (a) Explain the concept of a transaction with the help of an example. What are the properties of a transaction? Explain any *two* properties of a transaction. 7

(b) What is a lock ? Why are locks used ? Explain the two phase locking protocol with the help of an example. 7

(c) Explain the concept of backward recovery and forward recovery with the help of a diagram for each. 6

5. Write short notes on any *four* of the following : 4×5=20

(a) Multimedia database and challenges in designing multimedia database

(b) Knowledge databases

(c) Star and snowflake schema in the context of data warehouse

(d) Classification in the context of data mining

(e) Use of checkpoint in database recovery

(f) Nested queries in SQL

(g) Enhanced E-R model

× × × × ×

# BCS–131

## Practice Question Paper

### BCS-131 : : PROGRAMMING IN C++

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

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***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

1. (a) What is object - oriented programming paradigm ? Explain advantages of object -oriented programming paradigm over structured programming paradigm. 6

(b). What is a virtual function ? Write a program in C++ to create class Doctor with a virtual function salary. Derive class Visiting - Doctor and implement function salary in it. 10

**P. T. O.**

(c). What is function overloading ? How it is different from function overriding ? Explain with an example of each. 10

(d).What is an abstract class ? How do you create an abstract class ? What is the purpose of creating an abstract class in object oriented programming paradigm ?Explain with the help of an example. 6

(e).What are base and derived classes ? Create a base class called Stack and a derived class called Mystack. Write an interactive C++ program to show the operations of a stack. 8

2.(a) What do you mean by global variable and local variable in C++ ?Distinguish with an example. 5

(b). Define visibility of a class member. Why are different types of visibility modes needed in derivation of a derived class ? 5

(c). Differentiate between private, protected and public access modifiers with the help of an example for each. 5

(d) .What is function template ? Explain this concept, with the help of an example. 5

3. Write short notes on the following :

4 x 5=20

(a) Destructor

(b) File Handling

(c) Friend Function

(d) Multiple Inheritance

4.(a) What is a friend function ? Explain two merits and two demerits of using friend functions, with the help of an example. 10

(b). What is a stream manipulator ? Explain the use of setw( ) and setprecision( ) as stream manipulator. 5

(c). Differentiate between the following : 5

(i) Binary file and Text file

(ii) get( ) and getline( )

**P. T. O.**

# BCS–40

## Practice Question Paper
## BCS-040: Statistical Techniques

*Maximum Marks: 100*

***Note:***

- Attempt **all questions**.
- Non-scientific calculator is allowed.

1. (a) Calculate the **mean and standard deviation** for the following grouped data: 5

| Daily Wages | Number of Workers |
|---|---|
| 200–300 | 10 |
| 300–400 | 12 |
| 400–500 | 20 |
| 500–600 | 5 |
| 600–700 | 3 |
| 600–700 | 3 |

(b) The mean and standard deviation of 20 items are 10 and 2 respectively. One item with value 8 was found incorrect and deleted. Find the corrected mean and standard deviation. 5

2. (a) Box A contains 5 red and 4 blue balls. Box B contains 2 red and 5 blue balls. One ball is drawn from each box. Find the probability that one ball is red and the other is blue. 5

   (b)Suppose 2% of items manufactured in a factory are defective. Find the probability that : 5

   1. Exactly 3 items are defective in a sample of 100.
   2. No defective item occurs in a sample of 50.

3. (a) Find the correlation coefficient and slope of regression line Y on X from the following data : 5

   $\sum X=15, \sum Y=-6, \sum XY=50, \sum X^2=61, \sum Y^2=90, n=20$

(b) **Differentiate between any two of the following :** 5

i. Random Sampling and Non-Random Sampling
ii. Correlation and Regression
iii. Parametric and Non-Parametric Tests

4. (a)Define Time Series and explain its components with suitable examples. 5
   (b)Write short notes on any two : 5

i. Stratified Sampling
ii. Systematic Sampling
iii. Goodness of Fit Test
iv. Control Charts

5. A company wants to test whether three salesmen A, B and C have equal selling ability. Their weekly sales records are given below : 15

| Week | A | B | C |
|---|---|---|---|
| 1 | 16 | 22 | 25 |
| 2 | 20 | 20 | 24 |
| 3 | 18 | 15 | 16 |
| 4 | 25 | 26 | 20 |

Using **One-Way ANOVA**, test the hypothesis that all salesmen perform equally at 5% level of significance. Given: $F_{0.05}(2,9)=4.26$

6. The following contingency table presents analysis of persons according to hair color and eye color: 15

| Hair Colour | Blue | Grey | Brown | Total |
|---|---|---|---|---|
| Fair | 30 | 10 | 40 | 80 |
| Brown | 40 | 20 | 40 | 100 |
| Black | 50 | 30 | 40 | 120 |
| Total | 120 | 60 | 120 | 300 |

Test whether hair colour and eye colour are independent at 5% level of significance using Chi-Square Test. Given : $\chi^2_{0.05}(4) = 9.49$

7. A company manufactures pipes of small diameter. Four observations were 15

taken periodically and the data are given below :

| Sample No. | I | II | III | IV |
|---|---|---|---|---|
| 1 | 4.1 | 4.3 | 4.2 | 4.2 |
| 2 | 4.3 | 4.1 | 4.3 | 4.5 |
| 3 | 4.2 | 4.3 | 4.4 | 4.3 |
| 4 | 4.1 | 4.2 | 4.4 | 4.1 |

Calculate the control limits for :

1. Mean Chart (X-Chart)
2. Range Chart (R-Chart)

Given: $A_2=0.729$, D3=0, D4=2.282.

8. (a) Explain the Paired t-test with suitable example. 5
   (b) The pulse rates of 6 people before and after taking a new drug are given below: 10

| Before | 68 | 71 | 84 | 93 | 67 | 74 |
|---|---|---|---|---|---|---|
| After | 71 | 70 | 81 | 97 | 73 | 80 |

Test whether there is significant increase in pulse rate at 5% level of significance.

Given: $t_{0.05}(5) = 2.015$

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## Practice Question Paper

## MCS-206 : OBJECT ORIENTED PROGRAMMING USING JAVA

*Time : 3 Hours* *Maximum Marks : 100*

**Note :** Question No. 1 is compulsory. Attempt any *three* questions from the rest.

1. (a) What is a class ? How a class is defined in Java ? Explain the differences between public and private classes. 5

   (b) What is a Package in java ? Explain, with example, how a user defined package is created in java. 5

   (c) Write a Java program which take radius of a circle as input and display its area. Define appropriate class and methods in the program. 5

   (d) What is inheritance ? How it is implemented in Java ? Define Vehicle class and inherit classes "Two wheeler vehicle" and "four wheeler vehicle" from vehicle class. Define appropriate constructors in all these three classes. 10

   (e) What is File class in Java ? Explain the use of any two methods in File class. 5

   (f) What is assertions in Java ? Explain how assertions are enabled and disabled in Java. 5

   (g) Explain the use of JDBC in two-tier system. Also, explain the need of JDBC driver. 5

2. (a) Write a Java program to explain the use of "switch case" and "break" statements. 5

   (b) What is Polymorphism ? Explain compile time and runtime polymorphism ? 5

   (c) What is abstract class ? List its advantages. In java how an abstract class is defined ? Can you crate object from an abstract class ? Also, explain differences between abstract class and interface. 10

3. (a) What is an exception ? Discuss the Throwable class hierarchy. Also, explain checked and unchecked exception. 10

(b) Explain the use of the following classes in Java Programming with help of example. 10

i. Date

ii. List

4. (a) What are the various steps for connecting Java application with database using JDBC ? Explain with the help of program segment. Also, explain the difference between commit and rollback.10

(b) What is the need of event handling in GUI programming ? Explain how events are handled in Java Fx. 10

5. Write short notes on the following : 4×5=20

(a) Multithreading in Java

(b) Use of "finally" block in Exception Handling

(c) uses of "super" keyword

(d) Arrays in Java

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# Practice Question Paper

**BCS-053 : WEB PROGRAMMING**

*Maximum Marks : 50*

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***Note :*** *Question No.* ***1*** *is compulsory and carries 20 marks. Attempt any* ***three*** *questions from question nos.* ***2*** *to* ***5****.*

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1. (a) Explain the features of the following web technologies :4
   i) Mashups
   ii) Rich Internet Applications
   iii) Web services

   (b) Write a JSP program which may print the series of odd numbers from 1 to 100. Also find the sum of these numbers. 4

   (c) What is WAP ? Design a WML program to display the profile of an Item having attributes: Item Id, Item Name, Item Price and Item Quantity. 4

   (d) Explain MVC Architecture with the help of a diagram. 4

   (e) What is a cookie in the context of HTTP / Web Programming? Why are they needed? Explain with the help of an example. 4

2. (a) Write the DTD that validates the XML document created for the above assumptions. 5

   (b) Difference Between Two-Tier and Three-Tier Architecture. 5

3. (a) What are JDBC Driver(s)? Name them and differentiate between Two and Three tier database access models. 5

**P. T. O.**

(b) Create an XML document named Author. Every author should have a first name, last name and age field. Create records of two such authors. Also write the DTD that verifies the XML document of author. 5

4. (a) Explain with the help of an example, how JavaScript can be used for modifying content of a paragraph. 5

(b) What the use of "POST" method of HTTP ? Explain with the help of an example. 5

5. Explain any four of the following terms with the help of a diagram or an example : $4 \times 2\frac{1}{2} = 10$
   (a) JDBC-ODBC Bridge
   (b) Inline style sheet
   (c) Taglib directive
   (d) Mashups
   (e) 3-tier architecture

× × × × ×

# Practice Paper

## BCS-041 : FUNDAMENTALS OF COMPUTER NETWORKS

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *(i) Question no.* ***1*** *is compulsory.*

*(ii) Attempt any* ***three*** *questions from the rest.*

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1. (a) Discuss the need of modulation in computer networks. Compare ASK, FSK and PSK modulation techniques. 5

   (b) What is CRC (Cyclic Redundancy Check) ? Explain the working of CRC with suitable example. 5

   (c) Differentiate between classful and classless addressing. How does classless addressing reduce routing table size ? 5

(d) Differentiate between symmetric and asymmetric cryptography. Explain RSA algorithm with suitable example. 5

(e) What is the function of Datalink layer ? Briefly discuss the role of two sub-layers of Datalink layer. 5

(f) What is distance vector routing ? Briefly discuss the problem of distance vectors routing. 5

(g) What is stream cipher ? Give *two* advantages and *two* disadvantages of stream cipher. 5

(h) Differentiate between Symmetric and Asymmetric cryptography. 5

2.(a) Differentiate between pure ALOHA and slotted ALOHA. Also derive the maximum throughput of pure ALOHA. 10

(b)Explain Distance Vector Routing Algorithm with suitable example. Also discuss count-to-infinity problem. 10

3.(a) Write the step-by-step working of Link State Routing Algorithm with suitable example. 10

(b) Explain Go-Back-N Sliding Window Protocol with suitable example and diagram. Compare it with Selective Repeat Method. 10

4.(a) Discuss the functions of various layers of TCP/IP Model. Also mention the protocols defined under each layer. 10

(b) Explain the working and functions of the following networking devices : 2x5 =10

(i)Hub
(ii)Bridge
(iii)Switch
(iv)Router
(v) Repeater

5.Write short notes on the following : 4×5=20

(a) MD5 Digest

(b)Multiplexing

(c)Data Link Layer and its Sublayers

(d)3-Way Handshake Protocol

× × × × ×

# Practice Question Paper

## BCOC–131 : FINANCIAL ACCOUNTING

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *(i) Attempt any **five** questions.*

*(ii) Each question carries 20 marks.*

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1. (a) What are the basic accounting concepts and conventions? Explain with examples.. 10

   (b) Rectify the following errors and pass journal entries. Distinguish between capital and revenue expenditure with examples.. 10

2. (a) What is depreciation? Explain the straight-line and written-down value methods with examples. 10

   (b) Explain the features of consignment. Prepare Consignment Account in the books of the consignor 10

3. From the following transactions of M/s. Krishna & Sons, prepare cash book : 20

| 2018 | | ` |
|---|---|---|
| Aug. 01 | Cash in hand | 4,270 |
| Aug. 05 | Purchased an old typewriter for | 1,500 |
| Aug. 07 | Received cash from Mohan & Co. ` 1,980 and allowed discount of | 20 |
| Aug. 10 | Cash sales | 5,500 |
| Aug. 12 | Paid to Ramnarain ` 2,970 and he allowed a discount of | 30 |
| Aug. 14 | Sold old newspapers for | 60 |
| Aug. 16 | Received from Prasad ` 985 in full settlement of his account for | 1,000 |
| Aug. 18 | Purchased goods worth from Sanjeev Bros. at a trade discount of 10% and paid cash | 2,000 |

| | | |
|---|---|---|
| Aug. 20 | Sold goods worth for cash at a trade discount of 5% | 1,000 |
| Aug. 24 | Settled the account of Tiwari of by paying the necessary amount after deducting a discount of 3% | 500 |
| Aug. 30 | Paid rent | 500 |
| Aug. 30 | Deposited in the bank the cash in excess of | 1,490 |

4. What is a joint venture? How does it differ from a partnership? Prepare Joint Venture A/c and co-venturer's A/c.. 20

5. (a) What is a bill of exchange? Distinguish between a bill of exchange and a promissory note. 10

(b) Name the *three* methods for keeping accounts of a dependent branch and explain how each method determines

profit. 10

6. Mohan Tractors Ltd., Prayagraj, has a branch at Hissar. From the following particulars relating to the branch for the year ending December 31, 2020, prepare the Branch Account in the head office books : 20

| Balances as on 1-1-2020 : | ` |
|---|---|
| Stock at Branch | 10,000 |
| Branch Debtors | 4,000 |
| Petty Cash | 500 |
| Furniture | 2,000 |
| Prepaid Insurance | 150 |
| Salaries Outstanding | 1,00,000 |
| Goods sent to Branch | 80,000 |
| Cash Sales | 30,000 |

| | |
|---|---|
| Credit Sales | 40,000 |
| Cash received from Debtors (direct to H.O.) | 35,000 |
| Cash paid by Debtors | 2,000 |
| Provide depreciation on furniture @ 10% p.a. | |
| Discount allowed to Debtors | 100 |
| Cash sent to Branch : | |
| Rent | 2,000 |
| Salaries | 2,400 |
| Petty Cash | 1,000 |
| Good returned by Branch | 1,000 |
| Good returned by Debtors | 2,000 |
| Stock at Branch on 31-12-2020 | 5,000 |
| Petty Expenses paid by Branch | 850 |

| | |
|---|---|
| Insurance (upto 31-3-2021) | 600 |

7. Explain various methods of recording the joint venture transactions without maintaining separate set of books. 20

8. Radhika of Delhi and Sohika of Calcutta entered into a joint venture for the purchase and sale of goods. The profits and losses are to be

   shared in the ratio of 2 : 1. Radhika purchased goods for ` 40,000 and sent them to Sohika paying ` 3,000 for freight and insurance. Radhika also incurred sundry expenses amounting to ` 400. Sohika sold goods for ‘5,000 and incurred ` 6,000 as expenses. Unsold stock valued at ` 7,000 was taken over by Sohika. Sohika remitted the balance due to Radhika by a bank draft.

   Each party’s ledger contains a record of his

own transactions in the Joint Venture Account. 20

Prepare :

(a) Memorandum Joint Venture Account,

(b) Joint Venture with Sohika's Account in Radhika's Ledger, and

(c) Joint Venture with Radhika's Account in Sohika's Ledger.

9. Write notes on any ***two*** of the following : 2×10=20

(a) Computerised Accounting system and Manual Accounting Systems

(b) Different types of vouchers

(c) Accounting Period Concept

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# BACHELOR OF COMPUTER APPLICATIONS (BCA)

## Practice Question Paper

## BCS-151: INTRODUCTION TO SOFTWARE ENGINEERING

**Time: 3 Hours** **Maximum Marks: 100**

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**Note:** Question No. 1 is compulsory and carries 40 marks.
Attempt any three questions from the rest.

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1. **(a) Develop SRS for an Online System using IEEE SRS Format. 10**

- Characteristics of Good SRS
- IEEE SRS Structure

**(b) Explain Waterfall Model, Spiral Model and Prototype Model.**

**10**

- Advantages and Disadvantages
- Comparison between models
- Suitable situations for each model

**(c) What is Coupling and Cohesion? Explain with suitable examples.**

**10**

**(d) Explain Cost of Software Quality / Software Quality Factors.**

**10**

**2. (a) Draw Context Diagram and Level-1 DFD for an Online System. 10**

- Online Banking System
- Online Examination System
- Student Registration System

**(b) What is Software Maintenance? Explain different types of software maintenance. 10**

**3. (a) Draw Use-Case Diagram for: 10**

- Library Management System
- Railway Reservation System
- Online Examination System

**(b) Draw Gantt chart / PERT Chart for software development. 10**

**4. (a) Explain Unit Testing, Module Testing and Integration Testing with suitable examples. 10**

**(b) Explain Functional Testing, System Testing and Regression Testing. 10**

**5. Write any five short notes of the following: 4x5=20**

1. Capability Maturity Model (CMM)
2. Debugging Strategies
3. Project Planning
4. White box and Black box Testing
5. Software Metrics
6. Entity Relationship Diagram (ERD)
7. Structure Chart
8. Verification and Validation
9. Software Configuration Management (SCM)
10. Acceptance Testing

# Practice Question Paper

## BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

*Time : 2 Hours* *Maximum Marks : 50*

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***Note*** **:** *(i) Question* ***No. 1*** *is compulsory.*

*(ii) Answer any* ***three*** *questions from the rest.*

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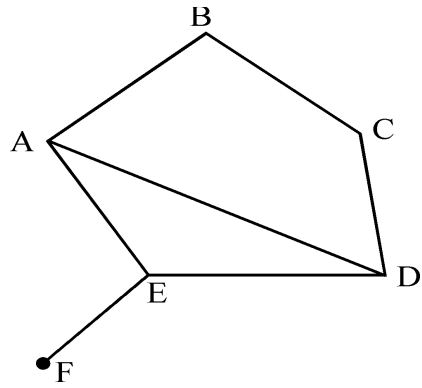
1. (a) What is complexity of algorithm ? Explain space complexity and time complexity of algorithms with the help of example. 5

(b) Write linear search algorithm and do analysis of this algorithm for best case and worst case. 5

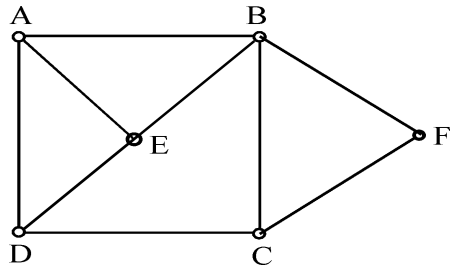
(c) Using mathematical induction method, show that for all positive integers $n$ : 5

$$1^2 + 2^2 + 3^2 + \ldots\ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

(d) What is Adjacency matrix ? Write adjacency matrix for the following graph : 5




2. (a) Write Depth-First Search (DFS) algorithm. Also traverse the following graph using DFS from node A. 7

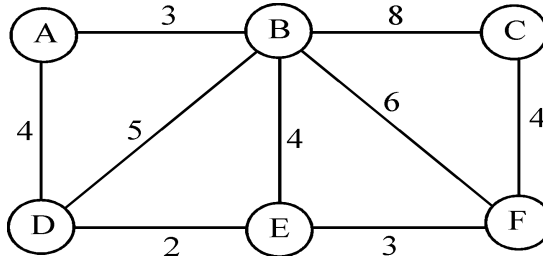



(b) Solve the following recurrence relation using recurrence tree method : 3

$$T(n) = 4T\left(\frac{n}{2}\right) + n$$

3. (a) Write Kruskal's algorithm for finding Minimum Cost Spanning Tree(MCST). Find

MCST of the following graph using Kruskal's algorithm. 8




(b) Explain use of Big oh (O) notation in the analysis of algorithms with example. 2

4. (a) Find the optimal solution to the knapsack (fractional) problem for $n$ = 5 and $m$ = 10, where $n$ is the number of objects and $m$ is the capacity of the knapsack.

Profit and weight of each object are given below : 6

$(P_1, P_2, P_3, P_4, P_5) = (10, 30, 35, 20, 40)$

$(W_1, W_2, W_3, W_4, W_5) = (3, 5, 2, 6, 11)$

(b) Apply Bubble sort algorithm to sort the following list of numbers. Show the procedure step-by-step. Calculate the number of exchange and comparison

operations required in the algorithm: 4

15, 8, 7, 11, 25,13, 12, 4

5. (a) Write and explain Dijkstra's single source shortest path problem. 6

(b) Write algorithm for adding two matrices of order $m \times n$ and find its time complexity. 4

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# BCOS–184

## Practice Question Paper

### BCOS-184: E-COMMERCE

*Time: 3 Hours* *Maximum Marks: 100*

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***Note:*** *Attempt any* ***five*** *questions. All questions carry equal marks.*

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1. Explain the evolution of e-Commerce. Discuss the advantages and disadvantages of e-Commerce. 6+7+7 = 20

2. What is Website Hosting? Discuss the various types of Website Hosting. 4+16 = 20

3. Differentiate between any four of the following:

(a) Internet and WWW

(b) Web Server and Application Server

(c) Digital Signature and Electronic Signature

(d) Traditional Payment and e-Payment

(e) Symmetric Encryption and Asymmetric Encryption 4×5 = 20

4. What is Cyber Crime? Discuss various cyber-crimes punishments under IT Act. 20

5. Explain e-Tailing and discuss its advantages for retailers as well as buyers. 20

6. Discuss Gartner's Model on Evolution of e-Government and e-Governance with suitable examples. 10+10 = 20

7. Write short notes on any four of the following:

(a) FinTech

(b) Digital India

(c) Distributed Ledger Technology (DLT)

(d) e-Wallet

(e) Shopping Cart  4×5 = 20

8. What is Digital Payment? Discuss categories of digital payment and their impact on e-Commerce. 4+8+8 = 20

9. Explain the App Development Process and discuss the 7C's of Retail Mix. 10+10 = 20

10. What is e-Banking? Discuss the difference among NEFT, RTGS and IMPS.  4+8+8 = 20

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# Practice Question Paper

## MCS–211 : DESIGN AND ANALYSIS OF ALGORITHMS

*Time : 3 Hours* *Maximum Marks : 100*

***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

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1. (a) Define algorithm. State any *four* important characteristics of an algorithm. 5

   (b) Write linear search algorithm and do analysis of this algorithm for best case and worst case. 5

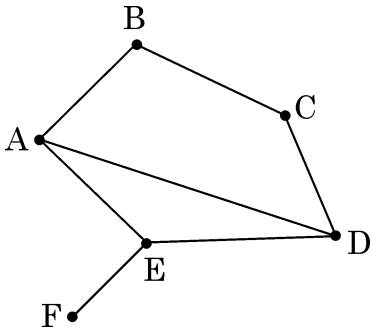
   (c) Solve the following recurrence relation using substitution method : 5

   $$T(n) = 2T\left(\frac{n}{2}\right) + n$$

   (d) What is NP class of problem? Explain with the help of an example problem. 5

   (e) What is Adjacency matrix**?** Write

adjacency matrix for the following graph : 5




(f) Write a mathematical definition of O (big oh). Assume that the function f(n) = $2n^2 + 3n + 1$. Show that f(n) = $O(n^2)$. 5

(g) Consider the following four matrices and their dimensions : 5

$$A(2;\ 4)\quad B(4,5)\quad C(5,3)\quad D(3,5)$$

Find the optimal parenthesization of matrix-chain multiplication $A \times B \times C \times D$.

(h) Explain the working principle of Floyd-Warshall's algorithm. 5

2. (a) Sort the following sequence of

numbers, using selection sort. Also find the number of comparisons and copy operations required by the algorithm is sorting this : 28, 13, 12, 28, 35, 11, 15, 9, 36 10

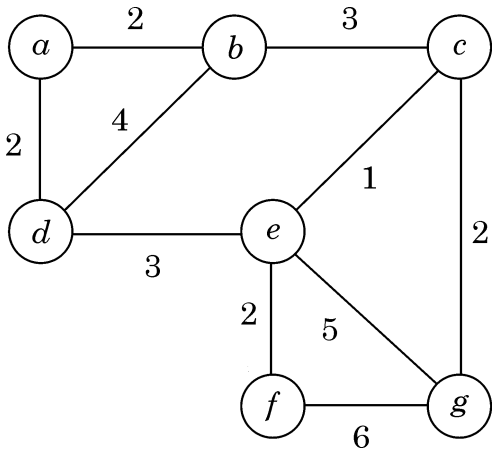
(b) Write an algorithm for quick sort. Sort the following sequence of numbers using quick sort :

15, 10, 13, 9, 12, 7

Analyze the time complexity of quick sort in best and worst case. 10

3. (a) What is Huffman coding ? Write the steps for building the Huffman tree with an example. 10

(b) Write and explain Prim's algorithm and use it to find a minimal spanning tree for the graph given below : 10



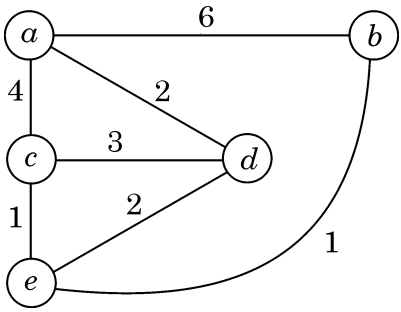

4. (a) Write an algorithm for solving fractional Knapsack problem. Using this algorithm, solve the following fractional Knapsack problem : 10

Capacity of Knapsack : 5 kg

Number of items : 5

| Objects | Weight (kg) | Profit |
|---|---|---|
| 1 | 2 | 10 |
| 2 | 3 | 5 |
| 3 | 5 | 15 |
| 4 | 7 | 7 |
| 5 | 1 | 6 |

(b) Write Dijkstra's algorithm and use it to find the minimum distance of all the nodes from node '*b*' which is taken as the source node, for the following graph : 10



5. (a) Describe the task scheduling algorithm as an optimization problem and calculate its complexity. Consider the following jobs and its service times and apply the task scheduling algorithm to minimize the total amount of time spent in the system. 10

| Job | Service time |
|---|---|
| 1 | 10 |
| 2 | 15 |
| 3 | 8 |
| 4 | 12 |
| 5 | 6 |

(b) Explain the use of master method. Write and interpret all the three cases of the master method to solve recurrence relation problem. 10

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## Practice Question Paper
## MCS-212: DISCRETE MATHEMATICS

*Maximum Marks : 100*

***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks.*
*Attempt any* ***three*** *questions from the rest.*

1. (a) Apply precedence rules and write truth table for the following expression: 5

   i) $p \longrightarrow q \wedge \sim r \leftrightarrow r \oplus q$

   ii) $(p \longrightarrow q) \leftrightarrow (\sim q \longrightarrow \sim p)$

   (b) What is a tautology? Find, if the following is a tautology without using truth table: $[(p \longrightarrow q) \wedge \sim q] \longrightarrow \sim p$ 4

   (c) Given the Boolean expression $(a' \vee (b \wedge c')) \wedge (b \vee d')$, draw the corresponding circuit, where a, b, c and d are the inputs to the circuitry. 5

   (d) Explain how principle of mathematical induction can be used to prove: 5

   $1+2+3+\cdots+n = \frac{n\,(n+1)}{2}$.

   (e) If A is a set with n elements, then prove that $|P(A)| = 2^n$, where P(A) is power set of A. 3

   (f) If $A = \{1, 2, 3, 4\}$ and $B = \{2, 3, 4, 5, 6, 7\}$ and f: A → B is $f(x) = x + 1$, then find the domain, co-domain and range of f. 4

   (g) Find inverse of the function $f(x) = \frac{x-2}{x-3}$ 4

   (h) Differentiate between the following: 5

   i) Deterministic finite automata and Non-deterministic finite automata

ii)Moore machines and Mealy machines

(i) What is Kleene closure? Find Kleene closure for $\Sigma = \{0,1\}$ and $\Sigma = \{aa,b\}$. 5

2. (a) Find the order and degree of the following recurrence relations: $a_n = a_{n-1} + a_{n-2}$ 3

(b) State Pigeonhole principle and Inclusion-Exclusion principle with suitable example. 3

(c) What are Bipartite graphs? Show that C6 is a Bipartite graph. 4

(d) Realize Conjunction, Disjunction and Negation (i.e. AND, OR and NOT) operation using switches. Also Explain Conjunctive Normal Form (CNF) with a suitable example. 6

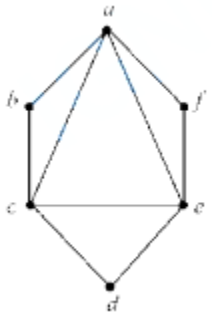
(e) What is regular expression? Find the regular expression for the language: L = {aa, aba, abba, abbba, .....} 4

3. (a) A committee of 2 men and 2 women is to be formed from 8 men and 9 women. In how many ways can this be done? 5

(b) Explain Tower of Hanoi and write its recurrence relation. 5

(c) Explain the Fibonacci numbers. Also explain the recurrence relation for Fibonacci numbers. 5

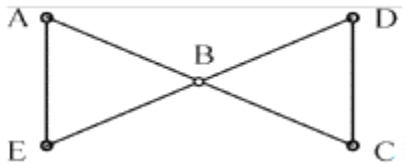
(d) Does the following graph have Eulerian circuit? If yes, give the Eulerian circuit, if no, explain the reasons: 5




4. (a) What are Hamiltonian graphs? Explain with the help of an example. 5

(b) Explain Handshaking theorem with suitable example. 5

(c)What is a spanning tree? Can we have a unique spanning tree? 5
Draw three spanning tress for the graph given below:




(d) What is Turing Machine? Explain the working of the constituent components of the Turing machine with the help of a block diagram 5

5. Explain any five of the following with suitable example for each : 5 * 4

i. Path and circuits in a graph
ii. Circuits and cycles in a graph
iii. Edge connectivity and Edge traceability
iv. Isomorphic graphs and conditions of isomorphism
v. Degree of a vertex

××××××××××

# Practice Question Paper

## MCS-215 : SECURITY AND CYBER LAWS

*Maximum Marks : 50*

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***Note :*** *Question No.* ***1*** *is compulsory.*

*Attempt any* ***three*** *questions from the rest.*

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**Q1. Answer the following questions:** ***(5 × 4 = 20 Marks)***

a) Define confidentiality, integrity and availability in information security.

b) Explain symmetric and asymmetric encryption with examples.

c) What is phishing? Explain different phishing attacks.

d) Describe the role of cyber laws in India.

e) Explain digital signatures and their applications.

Q2.Explain the OSI security architecture and discuss various security services and mechanisms. **(10 Marks)**

Q3. Discuss different types of malware and methods used to protect systems from malware attacks.**(10 Marks)**

Q4.Explain Public Key Infrastructure (PKI) and certificate management in detail. **(10 Marks)**

**Q5.** Discuss the Information Technology Act 2000 and its important amendments**.** (10 Marks)

**Q6.** What is network security? Explain firewalls, IDS and VPN with suitable examples. (10 Marks)

Q7.Write short notes on any two: **(5 + 5 = 10 Marks)**

a) Cyber Crime

b) SSL/TLS

c) Hash Functions

d) Access Control

× × × × ×

# Practice Question Paper

## MCS–218 : DATA COMMUNICATION AND COMPUTER NETWORKS

*Maximum Marks : 100*

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***Note :*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

---

*Question No.* ***1*** (8 × 5 = 40 Marks)

1. a. Why bit stuffing is advantageous over character Write the bit sequence after bit stuffing for the dat stream"110001111111100001111100".

   (b) Differentiate between simplex, half duplex and full duplex modes of data transmission.

   (c) What is data encoding ? Explain three different ways in which encoding of analog signal with analog information is performed.

   (d) What is Pipelining ? Explain selective repeat ARQ.

   (e) Write short notes on hidden station and exposed station problem.

   (f) Explain shortest path routing algorithm with a suitable example.

   (g) What is remote procedure call ? Mention some important features of UDP.

   (h) Define a cyber threat. List some common threats in a user's system.

   OR

(a) What are synchronous, asynchronous and isochronous communication techniques ?

(b) What is Phase Modulation Amplitude Modulation (AM) susceptible to noise ?Why is the most

(c) Define multiplexing and switching. What are the differences between ADSL and cable ?

(d) What is Internetworking ? Differentiate between star and ring topologies of networking.

e) Find the CRC for the data polynomial $x4 + x2 + x + 1$,where generator polynomial is $x3 + 1$.

f) What is meant by burst error ? How can burst errors be corrected

(g) Explain 802.11 protocol stack. What are source routing bridges ?

(h) How does CSMA/CD differ from CSMA/CA ?

2. a) Define Hamming Code. Write the bit stream generated by Hamming code for 001100. Explain?

(b) List and explain the functionalities of various layers in OSI reference model. Explain?

(c) What is Multiplexing ? Explain synchronous time division multiplexing. Explain?

(d) Define Hierarchical Routing. In which scenario, it is more advantageous ? Explain Reverse Path forwarding mechanism.

OR

Explain various network topologies with their advantages and disadvantages.

**(20 Marks)**

**OR**

3. (a)What is MANET? What are its applications ?

(b) Write the difference between IPv4 and IPv6.

(c) Discuss any two topologies for the point- to-point subnet.

(d)Explain the connection establishment and crash recovery in transport layer protocol.

**OR**

Q. Describe network security threats and explain different security mechanisms used in computer networks.

Q4. What is routing? Explain in details distance vector and link state routing algorithms. **(20 Marks)**

Q5.Write short notes on following:
a) DNS
b) HTTP and HTTPS
c) Switching Techniques
d) Bluetooth
e) Wi-Fi
**(5 × 4 = 20 Marks)**

× × × × ×

# MCS–219
# MASTER OF COMPUTER APPLICATIONS (MCA–NEW)
## Practice Questions Paper

## MCS-219 : OBJECT ORIENTED ANALYSIS AND DESIGN

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *(i) Question No. 1 is compulsory and carries 40 marks.*
*(ii) Attempt any three questions from the rest.*

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**1)** (a) What is OOAD ? Explain the advantages and basic principles of OOAD. **10**

(b) What is UML ? Explain its advantages. Draw hierarchy of UML-diagrams. **10.**

(c) What is association ? Explain one-to-one association with the help of an and UML diagram. Also explain how one-to-one association is implemented. **10**

(d) What is inheritance ? Explain advantages of inheritance with suitable example. **10**

**2.** (a) What is use-case diagram ? Explain its objectives and components.

Draw a use-case diagram for Online Examination System.

Make necessary assumptions. **10**

(b) What is DFD ? Draw 0-level, 1-level and 2-level

DFDs for Online Banking System. Also explain balancing in DFD. **10**

**3.** (a)What is state diagram ? Explain event, state and transition

with the help of an example. Draw state diagram for ATM System. **10**

(b) What is class diagram ? Draw class diagram for ATM System and explain it. **10**

**4.** (a) What is design documentation ? Explain features of a good design document. **10**

(b) Explain how object classes are mapped to database tables with suitable example. **10**

**5. Write short notes on the following : 4×5=20**

**a)** Aggregation
**b)** Collaboration diagram
**c)** Dynamic Model
**d)** Serialization

× × × × ×

# Practice Question Paper

## MCS–220: WEB TECHNOLOGIES

*Maximum Marks: 100*

***Note:*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

1. (a) Write short notes on a Servlet Architecture — *5*

   (b) Differentiate between session and cookie. — *5*

   (c) What are Annotations in Java? Discuss the applications of Java Annotations. — *5*

   (d) What is Maven? Draw the block diagram to exhibit the execution flow of Maven. — *5*

   (e) What is J2EE? Discuss the basic parts of the J2EE application model. — *5*

   (f) What is Spring Boot? Discuss the essential components of Spring Boot. — *5*

   (g) What is Custom CSS? How custom CSS can be included in to JSP? Discuss. — *5*

   (h) Write JSP program for Fibonacci series. Support your code with suitable comments. — *5*

2. (a) What is JSP? What are JSP directives? Explain the use of any two JSP directives with the help of a program. — *10*

   (b) What is Servlet Programming? Briefly explain

servlet life cycle. Also write a servlet which displays "welcome to web programming." 10

3. (a) What is Servlet? Explain the use of HTTP protocol in servlet programming. Explain the use of GET and POST methods, with the help of examples. 10

(b) What is JSP? What are JSP directives? Explain the use of any two JSP directives with the help of a program. 10

4. (a) Write short notes on the following : 5×2=10

   (i) Servlet Collaboration

   (ii) JSP Life Cycle

(b) Explain the following : 5×2=10

   (i) Java Cryptography Architecture (JCA)

   (ii) Java Secure Socket Extension (JSSE)

5. Write short notes on the following : 4×5=20

   a. Role Based Login

   b. Hibernate Entity life cycle

   c. SQL injection (SQLi)

   d. Insecure Direct Object Reference (IDOR)

   e. Denial-of-Service (DoS)

× × × × ×

# Practice Question Paper

## MCS–221: DATA WAREHOUSE AND DATA MINING

*Maximum Marks: 100*

***Note:*** *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

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1. (a) Define a Data Warehouse. List and explain the four characteristics of a Data Warehouse. **10**

   (b) Discuss ETL and its need. Explain in detail all the steps involved in ETL using a suitable diagram. **10**

   (c) Define ''data cleaning'' which is a data preprocessing technique. In this context, explain the concept of Noisy data cleaning along with some suitable examples. **10**

   (d) Write and explain the K-NN classification algorithm in Data Mining. Discuss its advantages and disadvantages. **10**

2. (a) Discuss the following Data Integration issues: **10**

   (i) Schema Integration and object modeling

   (ii) Redundancy

   (iii) Detection and Resolution of Data Value Conflicts

   (b) In the context of mining multimedia data on the web, explain the following terms: **10**

   (i) Page Rank

   (ii) Hits

**P. T. O.**

(iii) Page Layout Analysis

(iv) Vision Page Segmentation

3. (a) Define a Decision Tree. With the help of an example, explain the construction and representation of a decision tree. Also, mention its strengths and weaknesses. **10**

   (b) With the help of a diagram, describe the Conceptual Architecture of Hadoop Data Warehouse. **10**

4. (a) With the help of an example use-case, explain the Snowflake schema. List its advantages and disadvantages. **10**

   (b) Define Noisy data while doing data pre-processing. Delete the noise with Binning smoothing techniques for the following details using a partition in Bins (Equal-frequency): **10**

   4, 2, 6, 10, 8, 16, 12, 24, 22, 14, 26

   stored price details (in dollars).

5. Write short notes on any four of the following: **4×5=20**

   (a) Naive-Payes Classifier

   (b) Apriori Algorithm

   (c) Data Lake and its Architecture

   (d) Bayes' Theorem

   (e) Describe the following types of data marts:

   (i) Dependent data marts

   (ii) Independent data marts

.

× × × × ×

# Practice Paper

## MCS–224 : ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *(i) Question no.* ***1*** *is compulsory.*

*(ii) Attempt any* ***three*** *questions from the rest.*

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1. (a) Compare Descriptive, Predictive and Prescriptive Analytics in Machine Learning. 10

(b) Compare Classification and Clustering techniques with suitable examples. List algorithms used for each. 10

(c) Explain Turing Test with suitable example. Also discuss Chinese Room Test as criticism of Turing Test. 10.

(d) Explain Machine Learning Cycle with a suitable block diagram and explain each step.10

2.(a) What do you understand by State Space Search ? Explain state space representation of Water Jug Problem with suitable production rules. 10

(b) Differentiate between Forward Chaining and Backward Chaining with suitable examples.10

3.(a) Explain Reinforcement Learning with suitable block diagram. Explain the role of each component.10

(b) Explain Dimensionality Reduction. Discuss its techniques, advantages and disadvantages.10

4.(a) Explain Linear Regression and Logistic Regression with suitable examples. Differentiate between them. 10

(b) Write and explain Bayes Theorem. Also explain Naive Bayes Algorithm with suitable example. 10

5.Write short notes on the following : 4×5=20

**(a)**K-Means Clustering

**(b)**Apriori Algorithm

**(c)**Principal Component Analysis (PCA)

**(d)**Convolutional Neural Networks (CNN)

× × × × ×

# Practice Question Paper

## MCS-225 : ACCOUNTANCY AND FINANCIAL MANAGEMENT

*Time : 3 Hours* *Maximum Marks : 100*

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***Note*** **:** *(i) Attempt any **five** questions.*

*(ii) All questions carry equal marks.*

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1. From the following Trial Balance of Mohan Traders for the year ending 31st March, 2025 prepare Trading and Profit & Loss Account for the year ended 31st March, 2025

and Balance Sheet as on 31st March, 2025:

| Particulars | Amount (Dr.) (`) | Particulars | Amount (Cr.) (`) |
|---|---|---|---|
| Stock | 48,000 | Bank loan | 13,200 |
| Building | 72,000 | Creditors | 34,800 |
| Debtors | 51,000 | Capital | 96,000 |
| Machinery | 30,000 | Sales | 3,90,000 |
| Drawings | 12,000 | Discount | 1,200 |
| Purchases | 2,70,000 | Purchases returns | 2,400 |
| Insurance | 4,500 | Commission | 2,250 |
| Trade Expenses | 10,800 | Provision for bad debts | 1,200 |
| Sales return | 1,800 | Bills payable | 6,000 |
| Salaries | 24,600 | | |
| Carriage inwards | 3,750 | | |
| Bad Debts | 900 | | |
| Bills receivable | 13,500 | | |
| Cash | 4,200 | | |
| | 5,47,050 | | 5,47,050 |

Incorporate the following adjustments while preparing final accounts:

(i) Closing stock is valued at 36,000.

(ii) Provide interest on capital at 5%.

(iii) Outstanding salaries 2,400.

(iv) Prepaid insurance 450.

(v) Depreciation on building 2% and on machinery 10%.

(vi) Make a provision of 5% on debtors for bad debts.

(vii) Commission accrued and receivables 600.

2. Explain the following accounting concepts :

(i) Business Entity Concept

(ii) Budgetary Control

(iii) Going Concern Concept

(iv) Materiality Concept

3. Explain the meaning of financial ratios. Discuss the different categories of financial ratios and describe various solvency ratios in detail.

4. What do you understand by cost of capital? Explain the various constituents of 'capital' and discuss how cost of 'equity capital' is determined.

5. Define Working Capital and explain its importance. Discuss the various short-term and long-term sources of working capital finance

6. What do you understand by 'Receivables Management? Briefly discuss credit policy variables and explain the quantitative impact of relaxing credit standards and credit period on profits.

7. Explain the cash management cycle and discuss the motives for holding cash. Explain the Baumol's model for determining optimum cash balance.

8. Explain the reasons for holding inventory and discuss the objective of inventory and discuss the objective of inventory management. Explain the Economic Order Quantity (EOQ) approach of inventory Management.

# Practice Paper

## MCS-226 : DATA SCIENCE AND BIG DATA

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *(i) Question no.* ***1*** *is compulsory.*

*(ii) Attempt any* ***three*** *questions from the rest.*

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1. (a) What is Big Data ? Explain the characteristics (5Vs) of Big Data with suitable examples. 10.

(b) What is Apache Spark ? Explain its features and components. Compare Apache Spark with Hadoop. 10.

(c) Differentiate between DSMS and DBMS. Explain the concept of Data Streams with suitable examples. 10.

(d) What is Data Science Life Cycle ? Explain all phases involved in the life cycle 10

2.(a) Explain Conditional Probability and Bayes Theorem with suitable examples. 10

(b)Explain Logistic Regression and Linear Regression. Differentiate between them with examples. 10

3.(a) What is Random Forest ? Explain Random Forest and Decision Tree algorithms with suitable examples. 10

(b) What is Random Forest ? Explain Random Forest and Decision Tree algorithms with suitable examples. 10

4.(a) What is PageRank ? Explain Link Analysis with suitable examples. 10

(b) What is Data Cleaning ? Explain various Data Preprocessing techniques used in Data Science. 10

5.Write short notes on the following : 4×5=20

(a) Scatter Plot in R

(b) Histogram and Box Plot

(c) HIVE and HBase

(d) Similarity and Finding Similar Documents

× × × × ×

# Practice Question Paper

## MSC-227 : CLOUD COMPUTING AND IOT

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *(i) Question No. 1 is compulsory.*

*(ii) Answer any **three** questions from the rest.*

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**1.(**a) Explain Edge Computing and compare it with Fog Computing with suitable diagram**.** **(10 marks)**

(b) Define Load Balancing. Explain its role in cloud computing and any two load balancing approaches.

**(10 Marks)**

(c) Explain Virtualization and compare Full Virtualization and Para-Virtualization**. (10 Marks)**

(d) Explain IoT Security challenges and security mechanisms. **(10 Marks)**

**2.(a)** Explain Auto Scaling in cloud computing. Differentiate Horizontal and Vertical Scaling. **(10 Marks)**

**(b)** Explain Proactive Scaling and Reactive Scaling strategies. **(10 Marks)**

**3**.(a**)** Explain IoT communication protocols: MQTT, CoAP, XMPP, Zigbee and RFID. **(10 Marks)**

**(b)** Define VM Sizing and explain its techniques. **(10 Marks)**

**4.**(a) Explain applications of Cloud Computing. **(10 Marks)**

**(b)** Explain Resource Provisioning and differentiate Static and Dynamic provisioning. **(10 Marks)**

**5.**Write short notes on any four: **(4 × 5 = 20)**

1. Hypervisor
2. Applications of Fog Computing
3. Actuators and types
4. Cloud Security
5. IoT Sensors
6. LBaaS (Load Balancing as a Service)

**Practice Question Paper**

**MCS-230: DIGITAL IMAGE PROCESSING AND COMPUTER VISION**

*Time: 3 hours* *Maximum Marks: 100*

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***Note:*** *Question no.* ***1*** *is* ***compulsory****. Attempt any three questions from the rest. (Use of scientific calculation is allowed)*

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**1.** (a) Explain image digitization with sampling and quantization. — 5 Marks

(b) Explain DFT and its properties. — 5 Marks

(c) Differentiate supervised and unsupervised learning. — 5 Marks

(d) Explain Histogram Equalization. — 5 Marks

(e) Explain RGB and HSI colour models. — 5 Marks

(f) Explain Gaussian Noise and Rayleigh Noise.

— 5 Marks

(g) Explain K-Means clustering. — 5 Marks

(h) Explain Laplacian Filter. — 5 Marks

2. (a)Explain image enhancement techniques in spatial domain. — **10 Marks**

(b)Explain low pass and high pass filters with applications. —**10 Marks**

3. (a) Explain DCT and compare it with DFT. — **10 Marks**

(b)Explain Wavelet Transform and compare it with Fourier Transform. — **10 Marks**

4. (a) Explain image degradation and restoration model. — **10 Marks**

(b)Explain Gaussian noise and smoothing filters. — **10 Marks**

5. (a) Explain Bayes theorem and Bayes classifier. — **10 Marks**

(b) Explain Agglomerative Hierarchical Clustering. — **10 Marks**

**6.** (a) Explain RGB, CMYK and HSI colour models. — **10 Marks**

(b) Explain edge detection and region detection techniques. — **10 Marks**

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# Practice Question Paper

## MCS-231 : MOBILE COMPUTING

*Time : 3 Hours* *Maximum Marks : 100*

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***Note :*** *Question No. 1 is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

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1. (a) What is a cellular network ? Explain its various components. 10

   (b) Define the function mobile Operating . 10

   (c) What is Wireless Application Protocol (WAP) ? How does it work ? Discuss WAP Protocol stack. 10

   (d) With reference to Smart Client Architecture, explain the following approaches : 10

   (i) Thick Client Architecture

   (ii) Thin Client Architecture

2. (a) What is GSM technology? Explain its advantages and disadvantages. 10

(b) Draw the diagram to depict the process of End-to-End connection in Mobile TCP. Give advantages of Mobile TCP. 10

3. (a) Draw and explain Android architecture. 10

(b) What is GPRS? Explain its features. Also, list the services offered by it. 10

4. (a) Explain various components of J2ME. 10

(b) What is CDMA? How does it differ from GSM? 10

5. (a) Explain the features of iOS. 10

(b) Explain the features of XML. 10

× × × × ×