

Code No. 3197/BL

FACULTY OF SCIENCE
B.Sc. V-Semester (CBCS) Examination, June / July 2019

Subject : Computer Science

Paper – V : Programming in Java (DSC)

Time : 3 Hours

Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

- 1 What is the major difference between an interface and a class?
- 2 When do we declare a method or class abstract?
- 3 How do we set priorities for threads?
- 4 Define package. Write the syntax to create and import and package.
- 5 Explain JTable in swings with an example program.
- 6 What are the types of JDBC drivers?
- 7 Define thread. How do we start a thread?
- 8 Write about FileInputStream and FileOutputStream class.

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)

Note: Answer ALL the questions.

- 9 (a) Define class. Explain about class declaration, creating objects, methods declaration and invocation with syntax and an example.
OR
(b) Define inheritance. Explain the different types of inheritance. Write a program to demonstrate multiple inheritance in java.
- 10 (a) Define package. How do we add a class to package? Discuss the various levels of access protection available with an example.
OR
(b) What is a random access file? Why do we need a random access file? Write a program for reading / writing using random access file.
- 11 (a) Explain about JFrame, JApplet and JPanel by giving an example for each.
OR
(b) Explain the basic steps in developing a JDBC applications.

Code No. 2199 / BL

FACULTY OF SCIENCE
B.Sc. V-Semester (CBCS) Examination, June / July 2019

Subject : Computer Science

Paper – VI (B) : Software Engineering (DSE E - 2)

Time : 3 Hours

Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

- 1 Explain cost estimation for software maintenance.
- 2 Discuss how the specifications are validated and traced.
- 3 Explain cloud computing architecture.
- 4 Describe state machine diagram with an example.
- 5 Differentiate verification and validation process.
- 6 Write short notes on Code Reuse.
- 7 Explain prototype model for software development.
- 8 Write about Block Box Testing.

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)

Note: Answer ALL questions.

- 9 (a) Explain software development plan in detail.
OR
(b) Describe SRS structure in detail according to IEEE standards.
- 10 (a) Explain object oriented architecture with an example.
OR
(b) What is decision table? Explain with structure and an example.
- 11 (a) Explain components based software engineering architecture with an example.
OR
(b) Describe various quality metrics in detail.

Code No. 3190

FACULTY OF SCIENCE
B.Sc. V-Semester (CBCS) Examination, November / December 2018

Subject : Statistics

Paper – V (DSC) : Sampling Theory, Time Series, Index Numbers and Demand Analysis

Time : 3 Hours

Max. Marks: 60

PART – A (3 x 5 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

- 1 Define Sampling unit and sampling frame.
- 2 Explain probability sampling.
- 3 Explain about proportional allocation.
- 4 Explain about Random fluctuations in Time Series data.
- 5 Distinguish between Complementary and competitive commodities.
- 6 What is Giffen's paradox?
- 7 Explain chain base Index Numbers.
- 8 Explain the multiplicative and mixed model of a Time series data.

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)

Note: Answer ALL questions.

- 9 (a) Distinguish between sampling and non sampling errors. Give the sources of Non sampling errors.

OR

- (b) Define SRSWOR and SRSWR. Show that in SRSWOR the probability of selecting a specified unit of the population at any given draw is equal to the probability of selecting it at the first draw.

- 10 (a) What are the seasonal variations? Explain Ratio to Trend method of calculating seasonal variations. Also give its merits and demerits.

OR

- (b) Define Cost function. With a cost function $C = a + \sum_h c_h n_h$ prove that the variance of the estimated mean \bar{y}_x is minimum when n_h is proportional to $N_h S_h / \sqrt{C_h}$.

- 11 (a) Describe Leontief's method of estimating price elasticity of demand for time series data and its limitations.

OR

- (b) What is meant by (i) Base shifting (ii) Deflating (iii) Splicing of Index Numbers? Explain and illustrate.

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- 10 (a) Find the angle between the lines of intersection of
3 $10x + 7y - 6z = 0$ and $20x^2 + 7y^2 - 108z^2 = 0$

OR

- (b) Prove that the tangent planes to the cone $x^2 - y^2 + 2z^2 - 3yz + 4zx - 5xy = 0$
are perpendicular to the generators of the cone
 $17x^2 + 8y^2 + 29z^2 + 28yz - 46zx - 16xy = 0$

- 11 (a) Show that the enveloping cylinders of the ellipsoid $ax^2 + by^2 + cz^2 = 1$
with generators perpendicular to z-axis meet the plane $z = 0$ in parabolas.

OR

- (b) Find the locus of points from which three mutually perpendicular tangent lines
can be drawn to the conicoid $ax^2 + by^2 + cz^2 = 1$

Code No. 3185/E/BL

FACULTY OF SCIENCE
B.Sc. V-Semester (CBCS) Examination, June/July 2019

Subject : Mathematics
Paper – V : Linear Algebra (DSC)

Time : 3 Hours

Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

- 1 Give V_1 and V_2 in a vector space V and let $H = \text{span}\{V_1, V_2\}$. Show that H is a subspace of V .

- 2 Verify whether the vector $\begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ -3 \\ 2 \end{bmatrix}$ and $\begin{bmatrix} -8 \\ 5 \\ 4 \end{bmatrix}$ are Linearly Independent.

- 3 Let $b_1 = \begin{bmatrix} -9 \\ 1 \end{bmatrix}, b_2 = \begin{bmatrix} -5 \\ -1 \end{bmatrix}, c_1 = \begin{bmatrix} 1 \\ -4 \end{bmatrix}, c_2 = \begin{bmatrix} 3 \\ -5 \end{bmatrix}$ and consider the bases for \mathbb{R}^2 given by $\beta = [b_1, b_2]$ and $\zeta = [c_1, c_2]$. Find the change of coordinates matrix for β to ζ .

- 4 Find the characteristic polynomial and the real eigen values of the matrix

$$A = \begin{bmatrix} -4 & -1 \\ 6 & 1 \end{bmatrix}$$

- 5 Prove that an $n \times n$ matrix with n distinct eigen values is diagonalizable.

- 6 Write the properties of inner products of vectors in \mathbb{R}^n . Also find the norm of the vector $(1, -2, 2, 0)$.

- 7 Justify that can be 6×9 matrix have a two dimensional null space.

- 8 The set $\beta = \{1 + t, 1 + t^2, 1 + t^3\}$ is a basis for P_2 . Find the coordinate vector of $P(t) = 6 + 3t - t^2$ relative to β .

PART – B (3 x 15 = 45 Marks)

(Essay Answer Type)

Note: Answer ALL the questions.

9. (a) (i) State and prove the spanning set theorem.

- (ii) Suppose $V_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, V_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$ and $H = \left\{ \begin{bmatrix} S \\ S \\ 0 \end{bmatrix} \mid R \text{ where } S \in R \right\}$

Then is $\{V_1, V_2\}$ a basis for H ?

OR

..2..

(b) (i) State and prove the Rank theorem.

(ii) Find the base for the row space of the matrix

$$\begin{bmatrix} -2 & -5 & 8 & 0 & -17 \\ 1 & 3 & -5 & 1 & 5 \\ 3 & 11 & -19 & 7 & 1 \\ 1 & 7 & -13 & 5 & -3 \end{bmatrix}$$

10 (a) (i) Find the eigen values of $A = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$.

(ii) Prove that the eigen values of a triangular matrix are its diagonal elements.

OR

(b) Find the characteristics equation of

$$A = \begin{bmatrix} 5 & -2 & 6 & -1 \\ 0 & 3 & -8 & 0 \\ 0 & 0 & 5 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

also find algebraic multiplicity of the eigen values.

11 (a) Diagonalize the matrix, if possible

$$\begin{bmatrix} 2 & 4 & 3 \\ -4 & -6 & -3 \\ 3 & 3 & 1 \end{bmatrix}$$

OR

(b) (i) If $S = \{u_1, u_2, \dots, u_p\}$ is an orthogonal set of non zero vectors in \mathbb{R}^n , then prove that S is linearly independent.

(ii) Verify whether the set of vectors

$$\begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \text{ and } \begin{bmatrix} -5 \\ -2 \\ 1 \end{bmatrix} \text{ are orthogonal.}$$

Time : 3 Hours

Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

- 1 Find the equation of the sphere through the four points
 $(0, 0, 0), (-a, b, c), (a, -b, c), (a, b, -c)$
- 2 Find the equation of the tangent plane to the sphere
 $3(x^2 + y^2 + z^2) - 2x - 3y - 4z - 22 = 0$
- 3 Find the equation of the cone whose vertex is at the origin and which passes through the curve by the equations
 $ax^2 + by^2 + cz^2 = 1, \ell x + my + nz = p.$
- 4 Show that the general equation of a cone which touches the three coordinate planes is
 $\sqrt{f^2} \pm \sqrt{gy^2} \pm \sqrt{hz^2} = 0$
 Where f, g, h are parameters.
- 5 Find the equations to the tangent planes to $7x^2 - 3y^2 - z^2 + 21 = 0$ which passes through the line $7x - 6y + 9 = 0, z = 3$.
- 6 Find the pole of the plane $\ell x + my + nz = p$ with respect to the quadratic
 $ax^2 + by^2 + cz^2 = 1.$
- 7 Find the sphere having the circle $x^2 + y^2 + z^2 + 10y - 4z - 8 = 0, x + y + z = 3$ as the great circle.
- 8 Find the equation to the cone which passes through the three coordinate axes as well as the two lines.

$$\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}, \quad \frac{x}{-1} = \frac{y}{-1} = \frac{z}{1}$$

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)

Note: Answer ALL the questions.

- 9 (a) Find the equation of the sphere that passes through the two points
 $(0, 3, 0), (-2, -1, -4)$ and cuts orthogonally the two spheres
 $x^2 + y^2 + z^2 + x - 3z - 2 = 0, 2(x^2 + y^2 + z^2) + x + 3y + 4 = 0$
OR

- (b) Find the equations to the two spheres of the co-axial system
 $x^2 + y^2 + z^2 - 5 + \lambda(2x + y + 3z - 3) = 0$

Which touch the plane $3x + 4y = 15$

FACULTY OF SCIENCE
B.Sc. V-Semester (CBCS) Examination, November / December 2019

Subject : Mathematics (Solid Geometry)
Paper – VI-A (DSE E-1)

Time : 3 Hours

Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

- 1 Find the equation of the sphere which passes through the points
 $O(0, 0, 0), A(-1, 2, 3), B(1, -2, 3), C(1, 2, -3).$
- 2 Find the points of intersection of the line $2x - 1 = y + 3 = -z + 4$ with the sphere
 $x^2 + y^2 + z^2 - 6x + 8y - 4z + 4 = 0.$
- 3 Find the equation of the cone with vertex at $O(0, 0, 0)$ and passing through the circle
 $x^2 + y^2 + z^2 + x - 2y + 3z - 4 = 0, x - y + z = 2.$
- 4 Find the equation of the cylinder with generators parallel to $x - \text{axis}$ and passing through the curve
 $ax^2 + by^2 = 2cz, lx + my + nz = p$
- 5 Find the equation of the tangent plane to the conicoid $3x^2 - 5y^2 + z^2 + 2 = 0$ at point
 $P(1, 1, 0).$
- 6 Find the points of intersection of the line $\frac{x+5}{-3} = \frac{y-4}{1} = \frac{z-11}{7}$ with the conicoid
 $12x^2 - 17y^2 + 7z^2 = 7$
- 7 Find the condition that the spheres
 $a(x^2 + y^2 + z^2) + 2lx + 2my + 2nz + p = 0$ and
 $b(x^2 + y^2 + z^2) = k^2$ may cut orthogonally
- 8 Find the equation of the cone reciprocal to the cone $5x^2 + 9y^2 + 11z^2 = 0$

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)

Note: Answer ALL questions.

- 9 (a) If any tangent plane to the sphere $x^2 + y^2 + z^2 = r^2$ makes intercepts $a, b,$ and c on the co-ordinate axes, prove that

$$\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{r^2}$$

OR

- (b) Find the equation of the sphere having the circle
 $x^2 + y^2 + z^2 + 10y - 4z - 8 = 0, x + y + z = 3$ as the great circle.

- 10 (a) Find the equation of the cone whose vertex is $A(1, 2, 3)$ and guiding curve is the circle $x^2 + y^2 + z^2 = 4, x + y + z = 1.$

OR

- (b) Find the equation to the cylinder whose generators are parallel to $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and
guiding curve is $x^2 + y^2 = 16, z = 0$

- 11 (a) Show that the plane $3x + 12y - 6z - 17 = 0$ touches the conicoid
 $3x^2 - 6y^2 + 9z^2 + 17 = 0$, and find the point of contact.

OR

- (b) A Tangent plane to the conicoid $4x^2 + 6y^2 + 9z^2 = 1$ meets the coordinate axes in
 P, Q and R then find the locus of the centroid of triangle $PQR.$

FACULTY OF SCIENCE

B.Sc. V – Semester (CBCS) Examination, November / December 2019

Subject: Statistics

**Sampling Theory, Time Series,
Index Numbers and Demand Analysis**

Paper – V

Time: 3 Hours

PART – A (5x3 = 15 Marks)
(Short Answer Type)

Note: Answer any FIVE of the following questions. Each question carries 3 marks.

- 1 Write about principles of sampling
- 2 What is subjective sampling? Explain. Give an example.
- 3 Define stratified random sampling.
- 4 Explain about growth curves.
- 5 What are Index Numbers? State their uses.
- 6 Define the terms Demand, Supply and Price elasticity of demand.
- 7 Explain time reversal test.
- 8 Explain additive model of time series.

PART – B (3x15 = 45 Marks)
(Essay Answer Type)

Note: Answer all the following three questions. Each question carries 15 marks.

- 9 a) Where sampling and non-sampling errors. Write about sources of the same.
OR

- b) In SRSWOR, show that sample mean square is an unbiased estimator for population mean square.

- 10 a) Define systematic sampling procedure. Prove that

$$\sigma^2(\bar{y}_{sys}) = \frac{k-1}{nk} S_{wst}^2 [1 + (n-1) \rho_{wst}]$$

OR

- b) Explain link relatives procedure for determination of seasonal indices.

- 11 a) Explain Pigou's method for estimating demand function, stating assumptions.
Also mention its limitations.
OR

- b) Explain base shifting, forward and backward splicing procedures with examples.

29-11-2019

Code No. 8193

FACULTY OF SCIENCE

B.Sc. V – Semester Examination, November / December 2019

Subject: Statistics

Statistical Quality Control and Reliability

Time: 3 Hours

Paper: VI – A (DSE E – 1)

Max. Marks: 60

PART – A ($5 \times 3 = 15$ Marks)
(Short Answer Type)

Note: Answer any FIVE of the following questions. Each question carries 3 marks.

- 1 Write the uses of statistical quality control.
- 2 What are the different types of variables? Explain.
- 3 Write about importance of SQC in industry.
- 4 List the applications of C-Chart.
- 5 Define Natural Tolerance Limits and Specification Limits.
- 6 Explain the terms:
 - i) ASN
 - ii) ATI
 - iii) AOQL
- 7 Distinguish reliability and quality
- 8 Write about:
 - i) Failure Density
 - ii) Hazard Rate
 - iii) Modes of Failure.

PART – B ($3 \times 15 = 45$ Marks)
(Essay Answer Type)

Note: Answer all the following three questions. Each question carries 15 marks.

- 9 a) Define Statistical Quality Control. Explain the statistical basis for Shewart Control Charts.
OR
b) Explain interpretation of Mean and Standard Deviation Chart.
- 10 a) Derive modified control limits.
OR
b) Derive control limits for number of defects for 'n' units. Write interpretation of 'C' Chart.
- 11 a) Explain designing of double sampling plan and construction of its OC curve.
OR
b) Explain series and parallel configuration of a system and derive the reliabilities of the same.

..2..

(b) Find the dimension of the subspace

$$H = \left\{ \begin{bmatrix} a - 3b + 6c \\ 5a + 4d \\ b - 2c - d \\ 5d \end{bmatrix} : a, b, c, d \in \mathbb{R} \right\}$$

10 (a) Show that if v_1, v_2, \dots, v_r are eigen vectors that correspond to distinct eigen values $\lambda_1, \lambda_2, \dots, \lambda_r$ of an $n \times n$ matrix A then the set $\{v_1, v_2, \dots, v_r\}$ is linearly independent.

OR

(b) Is $\lambda = 3$ an eigen value of $\begin{bmatrix} 1 & 2 & 2 \\ 3 & -2 & 1 \\ 0 & 1 & 1 \end{bmatrix}$. If so find the one corresponding eigen vector.

11 (a) Diagonalize the matrix

$$A = \begin{bmatrix} 1 & 3 & 3 \\ -3 & -5 & -3 \\ 3 & 3 & 1 \end{bmatrix} \text{ if possible}$$

OR

(b) Let $y = \begin{bmatrix} 7 \\ 6 \end{bmatrix}$ and $u = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$. Find the orthogonal projection of y on to u. Then write y as the sum of two orthogonal vectors, one in $\text{span}\{u\}$ and other one orthogonal to u.

FACULTY OF SCIENCE
B.Sc. V-Semester (CBCS) Examination, November / December 2019

Subject : Mathematics (Linear Algebra)

Time : 3 Hours

Paper – V (DSC)

Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any five of the following questions.

- 1 Define null space of a matrix.
- 2 Find a matrix A such that $w = \text{Col } A$,

$$\text{where } w = \begin{bmatrix} 6a - b \\ a + b \\ -7a \end{bmatrix} : a, b \in \mathbb{R}$$

- 3 Find the eigen values of the matrix

$$A = \begin{bmatrix} 2 & 3 \\ 3 & -6 \end{bmatrix}.$$

- 4 Find the characteristic equation of the matrix

$$A = \begin{bmatrix} 5 & -2 & 6 & -1 \\ 0 & 3 & -8 & 0 \\ 0 & 0 & 5 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}.$$

- 5 If $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$, find a formula for A^k given that $A = PDP^{-1}$ where

$$P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}, D = \begin{bmatrix} 5 & 0 \\ 0 & 3 \end{bmatrix}.$$

- 6 Define orthogonal set.

- 7 Define vector subspace with an example.

- 8 Find $[\text{dist}(u_1 - v)]^2$.

PART – B (3x15=45 Marks)

(Essay Answer Type)

Note: Answer ALL from the questions.

- 9 (a) Let M_{2x2} be the vector space of all $2x2$ matrices and define $T: M_{2x2} \rightarrow M_{2x2}$ by

$$T(A) = A + A^T \text{ where } A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}. \text{ Show that } T \text{ is a linear transformation.}$$

OR

FACULTY OF SCIENCE

B.Sc. (CBCS) V - Semester Examination, November/December 2019

Subject: Computer Science (Software Engineering)

Paper: VI-B (DSE E-2)

Time: 3 Hours

Max. Marks: 60

*Part – A (5x3 = 15 Marks)
(Short Answer Type)*

Note: Answer any FIVE of the following questions.

1. Discuss different stages of software development process.
2. Explain the concept of traceability and validation of specifications.
3. Discuss the principles for architectural design.
4. Describe state machine diagram with an example.
5. Write good coding practices.
6. Explain Equivalence partitioning.
7. What is a decision tree? Give an example.
8. Write notes on debugging.

*Part – B (3x15 = 45 Marks)
(Essay Answer Type)*

Note: Answer ALL the following questions.

9. (a) Discuss generic software development process models with illustrations.
OR
(b) Describe the IEEE structure for SRS with its components.
10. (a) Discuss various architectural styles with examples and illustrations.
OR
(b) Describe object oriented design models.
11. (a) Explain various types of design patterns.
OR
(b) Describe all software quality metrics.

FACULTY OF SCIENCE

B.Sc. (CBCS) V - Semester Examination, November/December 2019

Subject: Computer Science (Programming in Java)

Paper: V (DSC)

Max. Marks: 60

Time: 3 Hours

Part - A ($5 \times 3 = 15$ Marks)
(Short Answer Type)

Note: Answer any FIVE of the following questions.

1. Write about different features of Java.
2. Write short notes on Interfaces.
3. Write briefly on multi threading.
4. What is a package? Write few inbuilt packages of Java.
5. Write short notes on Java Applet.
6. Write short notes on Dialog Box.
7. Write the structure of a Java program.
8. Write any three differences between Swing and AWT.

Part - B ($3 \times 15 = 45$ Marks)
(Essay Answer Type)

Note: Answer ALL the following questions.

9. (a) Explain the various types of control statements in Java with an example for each.
OR
(b) Explain different types of method overloading with examples.
10. (a) Explain wrapper classes in detail. Write a Java program to demonstrate wrapper class in Java.
OR
(b) Explain in detail about File Input Stream and File Output Stream class with an example.
11. (a) Explain about various AWT classes used in Java. Write a program using checkboxes.
OR
(b) Define Result set. Explain in detail about various Result Set objects in Java.
