CORE JAVA

(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt _any three_ of the following:**   15
   a. Explain primary datatype available in java
   b. Write a short note on features of java.
   c. What are the different applications we can create by using java?
   d. Write a short note on java API.
   e. Explain types of variable in Java.
   f. Explain arithmetic operator with example.

2. **Attempt _any three_ of the following:**   15
   a. Explain break and continue statement with example.
   b. Write a program to demonstrate method overriding .
   c. Explain varargs with example
   d. Explain static keyword in java.
   e. Write a short note on garbage collection
   f. Explain do while loop with example.

3. **Attempt _any three_ of the following:**   15
   a. Explain the terms/keywords : final , finally , finalize().
   b. What is abstraction? Explain abstract class and abstract method
   c. Differentiate between class and interface in Java.
   d. Explain how multiple inheritance is achieved in java with example.
   e. Explain this keyword with example.
   f. Write a Java program to create an interface Area with one method AreaCompute() with 2 float parameters. Design 2 classes Rectangle and Circle implementing the Area Interface.

4. **Attempt _any three_ of the following:**   15
   a. Explain any five methods of vector with example
   b. Write a program to take name roll no and age of student from user using command line Argument and store it in a file.
   c. Write a short note on array and explain its types.
   d. Explain wait(),notify(),notifyall() methods
   e. Write a program to find largest and smallest element in array.
   f. Write and explain any five build-in Exception in java

5. **Attempt _any three_ of the following:**   15
   a. Write about:Choice,CheckBox and List.
   b. Write a program to create menu and menu bar.
   c. What is Graphics Class? Explain any five methods of Graphics class.
   d. Explain adapter class with example.
   e. Write an AWT program to implement KeyListener Listener.
   f. Explain FlowLayout with example.

INTRODUCTION TO EMBEDDED SYSTEMS
(Time: 2½ hours)

Total Marks: 75

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1. **Attempt *any three* of the following:**   15
a. Write a short note on Embedded System history.
b. Describe all applications of Embedded System.
c. Write a short note on the following concept
    i. DSP
    ii. ASIC
d. Discuss the following concept
    i. Sensor
    ii. Actuator
e. Discuss Non-operational Quality Attributes.
f. List all classifications available in the Embedded System. Explain generation classification.

2. **Attempt *any three* of the following:**   15
a. How many Elements are available in the Embedded System? Explain Each Element.
b. Write a short note on AES.
c. Discuss the Memory mapping concept.
d. Explain the DMA process with a suitable diagram.
e. Write a short note on walking 1's testing perform on memory.
f. Discuss memory testing with one example of the CRC testing concept.

3. **Attempt *any three* of the following:**   15
a. Write and explain the following program using c programming for Embedded System
    WAP to send values 00 to FF to port P1
b. Write a short note on the concept
    i. Microcontroller
    ii. Microprocessor
c. Write a note on data types in embedded C.
d. Draw a neat pin diagram of the 8051 microcontroller.
e. Write and explain the following program using c programming for Embedded System
    WAP to demonstrate Traffic Signal.
f. Discuss Following Concept
    i. Emulator
    ii. Simulator

4. **Attempt *any three* of the following:**   15
a. Write and explain the block program with the following function
    i. Toggle
    ii. Delay
b. Define the following concept
    i. Linker
    ii. Locating
c. Write a short note on the Remote debugger.
d. Explain the concept of downloading the embedded code.
e. What are the factors to be considered in selecting a microcontroller for an embedded system? Discuss any one factor in detail.
f. Explain what is meant by the Infinite loop-based approach.

INTRODUCTION TO EMBEDDED SYSTEMS

5. **Attempt _any three_ of the following:**

a. What is the full form of OMA? Explain its goal.

b. Write a short note on JAVA.

c. Draw a diagram and explain the waterfall model.

d. Draw a diagram of the different phases of EDLC. Explain following phases

   i. Need

   ii. Analysis

e. Draw a diagram of the task state and explain it.

f. What is the meaning of a scheduler and explain common scheduling algorithms.

SOFTWARE ENGINEERING

(Time: 2½ hours)

Total Marks: 75

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1. **Attempt _any three_ of the following:**   15
a. Differentiate between generic software and customized software.
b. Explain the core principles of software engineering practice.
c. What is SRS? Describe its benefits.
d. Define the term software process and software project. Also explain the components of software process.
e. Explain the phases of Linear Sequential Model with a neat diagram.
f. Explain about Rational Unified Process.

2. **Attempt _any three_ of the following:**   15
a. Explain system engineering process in detail.
b. What is a Legacy system? Explain the quality of legacy system.
c. Explain these terms: i. Reliability ii. Availability iii. Maintainability iv. Survivability v. Security.
d. Explain the safety terminology.
e. Describe the requirement engineering task.
f. What is DFD? Explain the notations used for drawing a DFD.

3. **Attempt _any three_ of the following:**   15
a. Explain about user interface design and need of user interface design.
b. Write a short note on software risk.
c. State the difference between quality assurance and quality control.
d. Explain in detail software metric and measurement.
e. Explain the best practices followed in risk monitoring and control.
f. Explain Shewhart cycle with a neat diagram.

4. **Attempt _any three_ of the following:**   15
a. Explain different roles of inspection.
b. Explain black box testing and white box testing in detail.
c. Explain about verification and validation in brief.
d. What is size oriented metric? Explain.
e. Explain about Constructive Cost Model.
f. Explain the types of system testing.

5. **Attempt _any three_ of the following:**   15
a. Define software product lines. Explain its type.
b. Write a note on Capability Maturity Model Integration.
c. What is process change? Explain.
d. Differentiate between COTS – Integrated system and COTS – Solution system.
e. Define a software process. List and explain the types of process metrics.
f. What is meant by process improvement? Explain its stages.

COMPUTER GRAPHICS AND ANIMATION

(Time: 2½ hours)

Total Marks: 75

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1. **Attempt *any three* of the following:**   15
   a. Define the following: a) Morphing b) Horizontal Retrace c) Frame Buffer d) Pixel e) Resolution
   b. Explain the working of a CRT Monitor along with neat labeled diagram.
   c. Distinguish between Raster Scan System and Random Scan System.
   d. Draw a circle with center (0, 0) and radius as 3 using Bresenham Circle Drawing Algorithm.
   e. What is a Polygon. State and explain types of Polygon.
   f. Explain the acceptance and rejection test using bit codes in Cohen-Sutherland Clipping Algorithm.

2. **Attempt *any three* of the following:**   15
   a. Perform a 45° Rotation of an object with co-ordinates (2, 1), (5, 1) and (5, 6) in the clockwise direction and give the co-ordinates of the transformed object.
   b. Perform a following multiple transformation on ABCD where A(1, 1), B(1, 3), C (3, 3) and D (3, 1).
      i) Translate by 2 units uniformly.
      ii) Reflect about x-axis
   c. A Triangle A(3,2), B(5,2) and C(4,4) is rotated by 90^0 about Point A. Find new co-ordinates of Triangle ABC.
   d. Shear a unit cube situated at the origin with the shear transformation matrix given by:

$$\begin{bmatrix} 1 & 1.5 & 3 & 0 \\ 0.8 & 0 & 1 & 0 \\ 0.5 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

   e. What is Parallel Projection? Explain Orthographic and Oblique Projection.
   f. Explain the concept of Vanishing point in different perspective projection.

3. **Attempt *any three* of the following:**   15
   a. Explain the stages in 3D Viewing.
   b. Explain the concept of camera model and viewing pyramid with neat labeled diagram.
   c. What is Light? State the properties of Light.
   d. What is Ray Tracing?
   e. Define the terms: 1) Hue 2) Luminance 3) Saturation
   f. Explain the CMY Color Model.

COMPUTER GRAPHICS AND ANIMATION

4. **Attempt _any three_ of the following:**   15
   a. Distinguish between Object Space method and Image Space method.
   b. Explain Z-Buffer Algorithm.
   c. Explain the concept of Flood Fill Algorithm.
   d. State the Parametric Representation of a Circle and a Parabola along with examples.
   e. Write a note on Bezier Surfaces.
   f. Construct a Bezier Curve of order 3 with 4 polygon vertices. The co-ordinates of the polygon are A (0, 0), B (1, 2), C (3, 2), D (2, 0). Generate at least 3 points on the curve.

5. **Attempt _any three_ of the following:**   15
   a. Define Computer Animation. State and explain any two applications of Animation.
   b. Explain any five principles of Computer Animation.
   c. Write a short note on Procedural Animation.
   d. Write a note on Image Smoothing.
   e. Equalize the following histogram for L=8

Gray Level	0	1	2	3	4	5	6	7
No. of Pixel	123	78	281	417	639	1054	816	688

   f. What is Lossy and Lossless Image Compression? Explain.

COMPUTER ORIENTED STATISTICAL TECHNIQUES

(Time: 2½ hours)

Total Marks: 75

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1.   **Attempt _any three_ of the following:**   **15**

a.   If $\bar{x}$ is the mean of n observations $x_1, x_2, \ldots \ldots x_n$ then prove that $\sum_{i=1}^{n}(x_i - \bar{x}) = 0$

b.   The mean of 40 observations was 160. It was detected on rechecking that the value of 165 was wrongly copied as 125 for computation of mean. Find the correct mean.

c.   Find the mode:

Group	0-4	4-8	8-12	12-16
Frequency	10	20	30	30

d.   Find the quartile deviation:

x	5	10	15	20	25	30
f	2	3	8	7	6	4

e.   Find coefficient of standard deviation and coefficient of variation if $\sigma=1.516$ and mean = 9.

f.   Calculate mean deviation:

Class	2-4	4-6	6-8	8-10
frequency	20	40	30	10

2.   **Attempt _any three_ of the following:**   **15**

a.   Find first four moments about zero for the observations: 1, 2, 3, 3, 6.

b.   Compute S_k and interpret if
     a) mean = 108, mode = 99, $\sigma=5$.   b) $\sigma=4$, mean = 20.5, mode = 22.

c.   Explain Kurtosis and its types.

d.   If a pair of dice is thrown and X denotes the sum of the numbers on them. Find the probability distribution of X. Also find E(X).

e.   The data of a survey of 140 students showed that 37 study Music, 103 play a sport and 25 do neither. Create a Venn diagram to illustrate the data collected and then determine the probability of a student selected at random will study music.

f.   Explain reasons of sample survey.

3.   **Attempt _any three_ of the following:**   **15**

a.   Explain hypothesis and hypothesis testing.

b.   a sample of 100 tyres is taken from a lot. The mean life of tyres is found to be 39,350 km with a standard deviation of 3260 km. Could the sample come from a population with mean life 40,000 km? Establish 99 % confidence limits within which the mean life of tyres is expected to lie.

c.   A coin is tossed 100 times under identical conditions independently yielding 30 heads and 70 tails. Test at 1 % LOS whether or not the coin is unbiased. State clearly the null hypothesis and the alternate hypothesis.

d.   A random sample of 400 men is found to have a mean height of 69.2 inches and a standard deviation of 2.7 inches. Find 99 percent confidence limits of the true average height.

e.   In 324 throws of a six-faced dice, odd points appeared 180 time. Would you say that the dice is fair at 5% LOS?

f.   Explain one-tailed and two-tailed test.

COMPUTER ORIENTED STATISTICAL TECHNIQUES

4.   Attempt *any three* of the following: 15

a.   Ten oil tins are taken at random from an automatic filling machine. The mean weight of the tins is 15.8 kg and the standard deviation is 0.50 kg. Does the sample mean differ significantly from the intended weight of 16 kg?

b.   Tests for breaking were carried out on two lots of 5 and 9 steel wires respectively. The variance of one lot was 230 and other was 492. Is there a significant difference in their variability?

c.   Explain properties of F-distribution.

d.   200 randomly selected adults were asked whether TV shows as a whole are primarily entertaining, educational or a waste of time (only one answer could be chosen). The respondents were categorized as follows:

Gender	Opinion			Total
	Entertaining	Educational	Waste of time	
Female	52	28	30	110
Male	28	12	50	90
Total	80	40	80	200

e.   Applications of Chi-square test.

f.   If x is chi-square variate with standard deviation 4. Find the mean, median and mode of x.

5.   Attempt *any three* of the following:

a.   Explain types of correlation.   15

b.   Find the regression equation of y on x:

x	3	5	7	9	11
y	9	12	16	14	15

c.   Fit a parabola for the given data:

X	0	1	2	3	4
Y	5	4	9	20	37

d.   The two regression lines between x and y are given below. Find $\bar{x}, \bar{y}$ and r.
      $100y - 45x = 1400$
      $5x - 4y = 200$

e.   Compute correlation coefficient:

x	2	4	5	6	8	11
y	18	12	10	8	7	5

f.   If the regression lines y on x and x on y are given respectively by $y = a + bx$ and $x = a + by$ then prove that $b^2 = r^2$