

- 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
- What are Lambda Expressions in Java? Explain their syntax and provide an example of their usage.
 - Explain primary datatype available in Java.
 - Explain keywords and Identifiers in Java.
 - What is the purpose of relational operators in Java? Provide examples of how they are used in conditional statement.
 - What are the different applications we can create by using java?
 - Explain comments and its types.
2. Attempt any three of the following: 15
- Explain the syntax and use of the switch-case statement in Java. Provide an example.
 - What is a foreach loop? Write an example to iterate over an array of numbers using a foreach loop.
 - Explain varargs with example.
 - Write a short note on garbage collection.
 - What is method overloading? Write a program showing method overloading with two methods of the same name but different parameters.
 - What is the purpose of constructors in Java? Explain parameterized and default constructors with examples.
3. Attempt any three of the following: 15
- Explain abstract class with example.
 - What are the key differences between classes and interfaces in Java? List at least five differences.
 - Explain different ways to access package.
 - Write a Java program where an interface A has a method display(), another interface B has a method show(), and a class C implements both interfaces and defines both methods.
 - Define a constructor. How is it different from a normal function? Explain with an example.
 - Define 2 package to calculate area of circle and rectangle. Write a java program to create a class Area to import all the packages.
4. Attempt any three of the following: 15
- Describe the different states in a thread life cycle in Java with a diagram.
 - Write a program to demonstrate any five methods of vector.
 - Write a simple Java program to handle an exception using try-catch.
 - Write a program to find largest and smallest element in array.
 - Write a program to take name roll no and age of student from user using command line Argument and store it in a file.
 - Write and explain any five build-in Exception in java.
5. Attempt any three of the following: 15
- Write about: Choice, CheckBox and List.
 - Briefly explain: delegation model, event, event listeners, and sources.
 - Develop a java program to illustrate MouseMotion related events?
 - Write an AWT program to implement WindowListener Listener.
 - What is an Applet? Explain its life cycle in Java.

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 (6) Use of Non-programmable calculators is allowed.

1. **Attempt any three of the following:** 15
 - a. Explain history of Java.
 - b. What is the difference between default and parameterized constructors? Write a code example to demonstrate both.
 - c. Explain any five features of Java.
 - d. List and explain the different access modifiers in Java.
 - e. Write the basic structure of a Java program and explain the role of each component (class, main method, statements).
 - f. Define Class, Method and Object? Show the syntax to define these in Java.

2. **Attempt any three of the following:** 15
 - a. Explain the significance of this keyword in Java with an example.
 - b. Write a program to show how a derived class can override a method of its parent class.
 - c. Define an interface in Java. Write an example where a class implements multiple interfaces.
 - d. Explain how multiple inheritance is achieved in Java with example
 - e. Explain difference between method overloading and method overriding.
 - f. Write a Java program that demonstrates the use of an abstract class and abstract methods.

3. **Attempt any three of the following:** 15
 - a. List and explain any five built-in exceptions in Java.
 - b. Write a java program to create own exception for Negative Value Exception if the user enters negative value.
 - c. Explain the thread life cycle in Java with a diagram and examples for each state.
 - d. Define 1 Package Factorial. Write a Java program to create a class that import the package.
 - e. List and explain any five String methods in Java with example.
 - f. Write a Java Program to create 5 threads using Runnable Interface.

4. **Attempt any three of the following:** 15
 - a. Explain FlowLayout with example.
 - b. Explain Source, Event and Listeners in event handling.
 - c. Write a Java program to demonstrate the use of Flow Layout to arrange buttons horizontally.
 - d. Create a Swing application to create a frame with button named “square”, a label and TextField. Click the button should display square of that number in a label.
 - e. What is swing? Explain its features.
 - f. Write about: TextField, CheckBox and Label controls.

5. **Attempt any three of the following:** 15
 - a. Write a Java program to create a color chooser dialog using JColorChooser and apply the selected color to a component.
 - b. Consider a table student(roll no, name ,gender) write a program to accept the values at runtime and insert them in the database using prepare statement.
 - c. Explain JTabbedPane with example.
 - d. Write a Java program to demonstrate JScrollPane.
 - e. What is JDBC? Explain the architecture of JDBC in detail.

S.Y.B.Sc.(I.T.) – Semester IV
COMPUTER GRAPHICS AND ANIMATION

(Time: 2½ hours)

Total Marks: 75

- N. B.: (1) All questions are compulsory.
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(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. Describe computer graphics and illustrate its applications with examples.
- b. Differentiate between raster and vector graphics based on their definition, storage size, resolution, and scalability, quality and best used for.
- c. Describe the basic working principle of passive matrix LCD displays.
- d. Explain the acceptance and rejection test using bit codes in Cohen-Sutherland line clipping algorithm.
- e. Find the pixels of a line joining points A(-3,-2) and B(4, 5) using the DDA algorithm.
- f. Using the Liang-Barsky algorithm, clip the line segment joining the points (1, 1) and (8, 6) with a clipping window defined by the coordinates (2, 2) to (6, 5).

2. Attempt any three of the following:

15

- a. Describe the concept of scaling (2D) transformation in computer graphics. How is it applied to scale an object, and demonstrate the process with an example?
- b. Using the 2D rotation transformation, rotate the polygon with vertices A(1,1),B(2,2),C(3,1) by 90 degrees counterclockwise about the origin. What are the new coordinates of the vertices?
- c. Perform mapping from window to viewport coordinate transformation.
- d. Write a short note on 3D-rotation about an axis that is not parallel to one of the coordinate axes in brief.
- e. Explain the different types of Axonometric projections.
- f. Shear a unit cube situated at origin with a shear transformation matrix.

$$T_{\text{shear}} = \begin{bmatrix} 1 & 1.5 & 3 & 0 \\ 0.8 & 0 & 1 & 0 \\ 0.5 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

3. Attempt any three of the following:

15

- a. Describe the concept of the Canonical View Volume (CVV). How does it play a role in the transformation pipeline for 3D graphics.
- b. What are the different stages involved in the 3D viewing process? Explain each stage with the help of a labelled diagram.
- c. Provide a brief explanation of the following concepts related to the measurement of light and radiation:
i) Radiant Energy ii) Spectral Radiant Energy
- d. Write short note on photometry in detail.
- e. Explain RGB color space in detail.
- f. What are the various parameters used in color appearance.

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4. Attempt **any three** of the following: 15 :
- a. Write a short note on back face removal technique.
 - b. Explain visible surface ray tracing in brief with neat labelled diagram
 - c. Compare all visible surface detection methods.
 - d. Explain parametric representation of Parabola.
 - e. 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 2 points on the curve.
 - f. Explain Bezier surfaces in detail and state it's any five properties.

5. Attempt **any three** of the following: 15
- a. What is key framing? What are the advantages of key framing?
 - b. In the context of flocking behavior, how are groups of objects modeled and animated? Discuss the key rules or behaviors that govern their movement.
 - c. Explain the following principles of Animation
 - i. Squash and stretch
 - ii. Staging
 - d. Equalize the following histogram for $L=8$.

| | | | | | | | | |
|---------------------|----|----|----|----|----|----|----|----|
| Gray Level | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| No. of Pixel | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |

- e. Explain contrast stretching technique in detail with example.
- f. Write a short note on Image processing.

S.Y.B.Sc.(I.T.) – Semester IV
COMPUTER ORIENTED STATISTICAL TECHNIQUES

(Time: 2½ hours)

Total Marks: 75

- N. B.: (1) All questions are compulsory.
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 (3) Answers to the same question must be written together.
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 (5) Draw neat labeled diagrams wherever necessary.
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1. Attempt any three of the following:

15

a. Following data represent IQ level of 30 persons.

100, 105, 107, 115, 125, 124, 114, 121, 129, 102, 115, 112, 107, 109, 116, 120, 126, 102, 113, 115, 119, 110, 114, 111, 120, 112, 110, 106, 114, 115

- i) Construct frequency distribution table by taking classes 100-105, 105-110 & so on.
 ii) Calculate mode of the distribution.

b. The following data represent weight in gm. of 60 mangoes in a box. Calculate average weight & median.

| | | | | | |
|-------------------|---------|---------|---------|---------|---------|
| Weight in gm | 200-300 | 300-400 | 400-500 | 500-600 | 600-700 |
| Number of Mangoes | 7 | 11 | 18 | 14 | 10 |

- c. i) Car covers 60 km distance at the speed of 80 km/hr, 50 km distance at the speed of 55 km/hr. & 70 km distance at the speed of 45 km/hr. Calculate average speed of car
 ii) 60 boys have scored on an average 70.23 % marks. Girls have scored on an average 70.54 % marks. If in a class there are 130 students calculate average marks scored by class.

d. Calculate mean, standard deviation & coefficient of variation of the distribution given below.

| | | | | | |
|-----------------------------|-----|-----|-----|-----|------|
| Number of accidents per day | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 |
| Number of cities | 13 | 17 | 20 | 12 | 8 |

e. Calculate 85th percentile & 4th decile of the distribution given below.

| | | | | | |
|---------------------|---------|---------|---------|----------|-----------|
| Weekly wages in Rs. | 200-400 | 400-600 | 600-800 | 800-1000 | 1000-1200 |
| Number of workers | 125 | 145 | 220 | 170 | 140 |

f. Find mean, median & mode of the distribution given below

| | | | | | | |
|------------------|-----|----|-----|-----|----|----|
| Height in inches | 8.3 | 9 | 9.5 | 9.8 | 10 | 11 |
| Number of plants | 20 | 23 | 37 | 25 | 15 | 10 |

2. Attempt any three of the following:

15

a. It is observed that there are on an average 3 accidents per month in a city. Find the probability that

- i) There are no accidents
 ii) There are at most 2 accidents
 iii) There are at least three accidents.

b. Find mean & variance of the distribution given below

| | | | | | | |
|------|-----|------|-----|------|------|------|
| x | -2 | -1 | 0 | 1 | 2 | 3 |
| pi | k | $2k$ | k | $4k$ | $5k$ | $3k$ |

c. 1200 bulbs with mean life of 120 days are installed in a factory. Life of bulbs is normally distributed with standard deviation 20 days.

- i) How many bulbs will expire in less than 90 days?

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d. Calculate first 4 raw moments of the data given below

| | | | | | |
|-----|----|----|----|----|----|
| x | 2 | 5 | 6 | 10 | 12 |
| f | 10 | 12 | 18 | 15 | 5 |

e. Calculate Bowley's Coefficient of skewness

| | | | | | |
|---------------------------------------|-----|-----|-----|------|-------|
| Time taken to reach school in minutes | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 |
| Number of students | 123 | 137 | 200 | 180 | 120 |

f. Define: Skewness of a distribution. Explain Positively skewed, negatively skewed & Symmetrical Distribution. Support your answer with suitable diagram.

3. Attempt any three of the following:

a. An examination was given to two divisions A & B consisting of 40 and 50 students respectively. In division A, mean grade was 74 with a standard deviation of 8 while in division B, mean grade was 78 with a standard deviation of 7. Can we claim that performance of div B is better than div A? Use 1 % level of significance

b. Explain the terms: Critical Region & Level of Significance

c. A sample of 150 electric bulbs produced by manufacturer A showed mean life of 1400 hrs. with standard deviation 120 hrs. A sample of 200 electric bulbs produced by manufacturer B showed mean life of 1200 hrs. with standard deviation 80 hrs. Find 95% confidence limits for difference between 2 means of populations A & B.

d. A manufacturer of pens claims that a certain pen manufactured by him has mean writing life at least 460 pages. To test his claim, sample size 100 pens were tested. It is found that average writing life of pens is 453 pages with SD 25 pages. Do you support manufacture's claim? Use 5 % level of significance.

e. The manufacturer of a patent medicine claims that it is 90 % effective in relieving an allergy for a period of 8 hrs. In a sample of 200 people who had allergy, the medicine provided relief for 160 people. Do you support manufacturer's claim? Use 1 % level of significance.

f. A small poll of 300 voters from district A & 200 voters from district B showed that 56% & 48 % respectively were in favor of a candidate. At 5 % level of significance test the hypothesis that there is no difference between the supporters from 2 districts.

15

4. Attempt any three of the following:

a. Company supplies tooth paste in a packing of 100 gm. A sample of 9 packing gave the following results: 100.5, 100.3, 100.1, 99.8, 99.7, 99.7, 100.3, 99.2, 99.3
Does the sample support the claim of company that packing weight is 100 gm? Use 5% level of significance.

b. Samples of electric bulbs of 2 companies were tested for their average life & following information were recorded

| | Company A | Company B |
|----------------------------|-----------|-----------|
| Size of sample | 6 | 7 |
| Average life in hrs. | 1210 | 1314 |
| Standard deviation in hrs. | 36 | 42 |

15

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COMPUTER ORIENTED STATISTICAL TECHNIQUES

c. In the past, a machine has produced washers having a thickness of 0.050 inch. To determine whether the machine is in proper working order, a sample of 10 washers is chosen, for which the mean thickness is 0.053 inch and the standard deviation is 0.003 inch. Test the hypothesis that the machine is in proper working order. Use 1 % levels of significance

d. Librarian claims that number of books issued from public library are uniformly distributed throughout the week. The following data represent the number of books issued from a public library during a particular week. Use 1% levels of significance to test librarian's claim.

| Day | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|------------------------|--------|---------|-----------|----------|--------|----------|
| Number of books issued | 25 | 54 | 66 | 70 | 35 | 80 |

e. The following table represent information about preference for online shopping of female & male. At 5% level of significance test whether preference of online shopping depends upon gender

| | Preferred | Do not preferred |
|--------|-----------|------------------|
| Male | 10 | 32 |
| Female | 38 | 20 |

f. In his experiments with peas, Gregor Mendel observed that 882 were round and yellow, 313 were round and green, 287 were wrinkled and yellow and 118 were wrinkled and green. According to his theory of heredity, the numbers should be in the proportion 9: 3: 3: 1. Is there any evidence to support theory? Use 5 % level of significance

5. Attempt any three of the following:

a. Discuss various types of correlation with the help of scatter diagram.

b. The following table shows production of fans per year. Find the trend values & hence, find the production for the year 2010

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--------------------|------|------|------|------|------|------|
| Production of fans | 450 | 340 | 400 | 550 | 600 | 580 |

c. The following data represent price in Rs. & demand in kg of 6 different commodities. Find the price of commodity whose demand is 20 kg.

| | | | | | | |
|---------------|----|----|----|----|----|----|
| Price in Rs. | 60 | 8 | 80 | 56 | 72 | 20 |
| Demand in kg. | 15 | 28 | 10 | 16 | 12 | 25 |

d. Two regression equations of lines are $3x + 2y - 260 = 0$ and $6x + y - 310 = 0$ Find

- i) Means of x & y
- ii) Regression Coefficients of both lines
- iii) Correlation coefficient between x & y .
- iv) Standard deviation of y if variance of x is 100.

e. Fit an exponential curve of the form $y = ax^b$ passing through following set of values

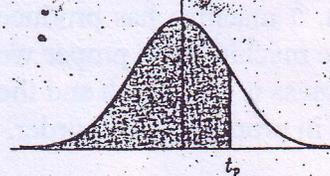
| | | | | | |
|-----|-----|-----|------|------|-----|
| x | 1 | 2 | 3 | 4 | 5 |
| y | 1.2 | 9.6 | 32.4 | 76.8 | 150 |

f. A sample of 8 pairs of observation of x & y lead to the following result.

$$\sum x = 72, \quad \sum y = 120, \quad \sum x^2 = 732, \quad \sum y^2 = 1958, \quad \sum xy = 1191$$

Appendix III

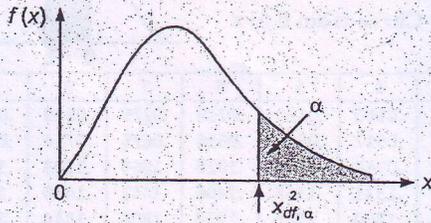
Percentile Values (t_p)
for
Student's t Distribution
with ν Degrees of Freedom
(shaded area = p)



| ν | $t_{.995}$ | $t_{.99}$ | $t_{.975}$ | $t_{.95}$ | $t_{.90}$ | $t_{.80}$ | $t_{.75}$ | $t_{.70}$ | $t_{.60}$ | $t_{.55}$ |
|----------|------------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | 63.66 | 31.82 | 12.71 | 6.31 | 3.08 | 1.376 | 1.000 | .727 | .325 | .158 |
| 2 | 9.92 | 6.96 | 4.30 | 2.92 | 1.89 | 1.061 | .816 | .617 | .289 | .142 |
| 3 | 5.84 | 4.54 | 3.18 | 2.35 | 1.64 | .978 | .765 | .584 | .277 | .137 |
| 4 | 4.60 | 3.75 | 2.78 | 2.13 | 1.53 | .941 | .741 | .569 | .271 | .134 |
| 5 | 4.03 | 3.36 | 2.57 | 2.02 | 1.48 | .920 | .727 | .559 | .267 | .132 |
| 6 | 3.71 | 3.14 | 2.45 | 1.94 | 1.44 | .906 | .718 | .553 | .265 | .131 |
| 7 | 3.50 | 3.00 | 2.36 | 1.90 | 1.42 | .896 | .711 | .549 | .263 | .130 |
| 8 | 3.36 | 2.90 | 2.31 | 1.86 | 1.40 | .889 | .706 | .546 | .262 | .130 |
| 9 | 3.25 | 2.82 | 2.26 | 1.83 | 1.38 | .883 | .703 | .543 | .261 | .129 |
| 10 | 3.17 | 2.76 | 2.23 | 1.81 | 1.37 | .879 | .700 | .542 | .260 | .129 |
| 11 | 3.11 | 2.72 | 2.20 | 1.80 | 1.36 | .876 | .697 | .540 | .260 | .129 |
| 12 | 3.06 | 2.68 | 2.18 | 1.78 | 1.36 | .873 | .695 | .539 | .259 | .128 |
| 13 | 3.01 | 2.65 | 2.16 | 1.77 | 1.35 | .870 | .694 | .538 | .259 | .128 |
| 14 | 2.98 | 2.62 | 2.14 | 1.76 | 1.34 | .868 | .692 | .537 | .258 | .128 |
| 15 | 2.95 | 2.60 | 2.13 | 1.75 | 1.34 | .866 | .691 | .536 | .258 | .128 |
| 16 | 2.92 | 2.58 | 2.12 | 1.75 | 1.34 | .865 | .690 | .535 | .258 | .128 |
| 17 | 2.90 | 2.57 | 2.11 | 1.74 | 1.33 | .863 | .689 | .534 | .257 | .128 |
| 18 | 2.88 | 2.55 | 2.10 | 1.73 | 1.33 | .862 | .688 | .534 | .257 | .127 |
| 19 | 2.86 | 2.54 | 2.09 | 1.73 | 1.33 | .861 | .688 | .533 | .257 | .127 |
| 20 | 2.84 | 2.53 | 2.09 | 1.72 | 1.32 | .860 | .687 | .533 | .257 | .127 |
| 21 | 2.83 | 2.52 | 2.08 | 1.72 | 1.32 | .859 | .686 | .532 | .257 | .127 |
| 22 | 2.82 | 2.51 | 2.07 | 1.72 | 1.32 | .858 | .686 | .532 | .256 | .127 |
| 23 | 2.81 | 2.50 | 2.07 | 1.71 | 1.32 | .858 | .685 | .532 | .256 | .127 |
| 24 | 2.80 | 2.49 | 2.06 | 1.71 | 1.32 | .857 | .685 | .531 | .256 | .127 |
| 25 | 2.79 | 2.48 | 2.06 | 1.71 | 1.32 | .856 | .684 | .531 | .256 | .127 |
| 26 | 2.78 | 2.48 | 2.06 | 1.71 | 1.32 | .856 | .684 | .531 | .256 | .127 |
| 27 | 2.77 | 2.47 | 2.05 | 1.70 | 1.31 | .855 | .684 | .531 | .256 | .127 |
| 28 | 2.76 | 2.47 | 2.05 | 1.70 | 1.31 | .855 | .683 | .530 | .256 | .127 |
| 29 | 2.76 | 2.46 | 2.04 | 1.70 | 1.31 | .854 | .683 | .530 | .256 | .127 |
| 30 | 2.75 | 2.46 | 2.04 | 1.70 | 1.31 | .854 | .683 | .530 | .256 | .127 |
| 40 | 2.70 | 2.42 | 2.02 | 1.68 | 1.30 | .851 | .681 | .529 | .255 | .126 |
| 60 | 2.66 | 2.39 | 2.00 | 1.67 | 1.30 | .848 | .679 | .527 | .254 | .126 |
| 120 | 2.62 | 2.36 | 1.98 | 1.66 | 1.29 | .845 | .677 | .526 | .254 | .126 |
| ∞ | 2.58 | 2.33 | 1.96 | 1.645 | 1.28 | .842 | .674 | .524 | .253 | .126 |

Source: R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research* (5th edition), Table III, Oliver and Boyd Ltd., Edinburgh, by permission of the authors and publishers.

Table A5: Critical Values of Chi-Square (χ^2)



| Degree of freedom | 0.100 | 0.050 | 0.025 | 0.010 | 0.005 | 0.001 |
|-------------------|-------|-------|-------|-------|-------|-------|
| 1 | 2.71 | 3.84 | 5.02 | 6.63 | 7.88 | 10.8 |
| 2 | 4.61 | 5.99 | 7.38 | 9.21 | 10.6 | 13.8 |
| 3 | 6.25 | 7.81 | 9.35 | 11.3 | 12.8 | 16.3 |
| 4 | 7.78 | 9.49 | 11.1 | 13.3 | 14.9 | 18.5 |
| 5 | 9.24 | 11.1 | 12.8 | 15.1 | 16.7 | 20.5 |
| 6 | 10.6 | 12.6 | 14.4 | 16.8 | 18.5 | 22.5 |
| 7 | 12.0 | 14.1 | 16.0 | 18.5 | 20.3 | 24.3 |
| 8 | 13.4 | 15.5 | 17.5 | 20.1 | 22.0 | 26.1 |
| 9 | 14.7 | 16.9 | 19.0 | 21.7 | 23.6 | 27.9 |
| 10 | 16.0 | 18.3 | 20.5 | 23.2 | 25.2 | 29.6 |
| 11 | 17.3 | 19.7 | 21.9 | 24.7 | 26.8 | 31.3 |
| 12 | 18.5 | 21.0 | 23.3 | 26.2 | 28.3 | 32.9 |
| 13 | 19.8 | 22.4 | 24.7 | 27.7 | 29.8 | 34.5 |
| 14 | 21.1 | 23.7 | 26.1 | 29.1 | 31.3 | 36.1 |
| 15 | 22.3 | 25.0 | 27.5 | 30.6 | 32.8 | 37.7 |
| 16 | 23.5 | 26.3 | 28.8 | 32.0 | 34.3 | 39.3 |
| 17 | 24.8 | 27.6 | 30.2 | 33.4 | 35.7 | 40.8 |
| 18 | 26.0 | 28.9 | 31.5 | 34.8 | 37.2 | 42.3 |
| 19 | 27.2 | 30.1 | 32.9 | 36.2 | 38.6 | 43.8 |
| 20 | 28.4 | 31.4 | 34.2 | 37.6 | 40.0 | 45.3 |
| 21 | 29.6 | 32.7 | 35.5 | 38.9 | 41.4 | 46.8 |
| 22 | 30.8 | 33.9 | 36.8 | 40.3 | 42.8 | 48.3 |
| 23 | 32.0 | 35.2 | 38.1 | 41.6 | 44.2 | 49.7 |
| 24 | 33.2 | 36.4 | 39.4 | 43.0 | 45.6 | 51.2 |
| 25 | 34.4 | 37.7 | 40.6 | 44.3 | 46.9 | 52.6 |
| 26 | 35.6 | 38.9 | 41.9 | 45.6 | 48.3 | 54.1 |
| 27 | 36.7 | 40.1 | 43.2 | 47.0 | 49.6 | 55.5 |
| 28 | 37.9 | 41.3 | 44.5 | 48.3 | 51.0 | 56.9 |
| 29 | 39.1 | 42.6 | 45.7 | 49.6 | 52.3 | 58.3 |
| 30 | 40.3 | 43.8 | 47.0 | 50.9 | 53.7 | 59.7 |
| 35 | 46.1 | 49.8 | 53.2 | 57.3 | 60.3 | 66.6 |
| 40 | 51.8 | 55.8 | 59.3 | 63.7 | 66.8 | 73.4 |
| 45 | 57.5 | 61.7 | 65.4 | 70.0 | 73.2 | 80.1 |
| 50 | 63.2 | 67.5 | 71.4 | 76.2 | 79.5 | 86.7 |

**S.Y.B.Sc.(I.T.) – Semester IV
SOFTWARE ENGINEERING**

(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. State the SDLC phases in brief.
 - b. Write note on functional and non-functional requirements.
 - c. Explain all phases of the waterfall model.
 - d. What is software? what are the characteristics of software?
 - e. Explain Agile methodology.
 - f. Describe the quality criteria of a good SRS.

2. **Attempt any three of the following:** 15
 - a. Explain the issues in requirement gathering.
 - b. Explain the importance of feasibility study in the requirements engineering process.
 - c. What is critical system? List the types of critical system and explain anyone in detail with an example.
 - d. What is data modeling and its types?
 - e. What is a socio-technical system, state its essential characteristics.
 - f. What are the behavioral model and its types?

3. **Attempt any three of the following:** 15
 - a. Write short note on modular decomposition styles.
 - b. What is Software quality management? What are the different activities of software quality management?
 - c. Describe various management activities.
 - d. What is Software quality? what are the different factors effect on software quality?
 - e. State the difference between quality assurance and quality control.
 - f. Write short notes on: Risk Control.

4. **Attempt any three of the following:** 15
 - a. What is test case design? What are the different parameters of test case?
 - b. Explain software measurement.
 - c. Explain automated testing process.
 - d. What is component testing? What are the different test strategy of component testing?
 - e. Explain inspection process in brief.
 - f. Explain size-oriented metrics.

5. **Attempt any three of the following:** 15
 - a. Write notes on software product lines.
 - b. Write note on reuse landscape.
 - c. Write note on the application framework.
 - d. Write note on process analysis and modeling.
 - e. Explain CMMI process improvement framework.
 - f. What is mean by process improvement? What are the different process improvement stages?

S.Y.B.Sc.(I.T.)
INTRODUCTION TO EMBEDDED SYSTEMS
(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 the various purposes of using an embedded system.
 - b. Write the difference between ARM and X86.
 - c. Discuss the PIC Microcontroller's advantages and disadvantages.
 - d. Describe the Embedded System with its applications.
 - e. List and elaborate on the ARM Microcontroller's advantages and disadvantages.
 - f. Write a short note on PIC memory organisation.

2. Attempt any three of the following: 15
- a. Discuss Zigbee technology.
 - b. Explain Radio Frequency Identification.
 - c. Write a short note on GPS.
 - d. What is the role of SPI in embedded systems?
 - e. Explain the following concept
 - i) Full duplex method
 - ii) Half duplex method
 - f. Write a short note on I2C devices.

3. Attempt any three of the following: 15
- a. Write a short note on Arduino's unique features.
 - b. Discuss the following function
 - i) analogRead()
 - ii) delay()
 - c. Explain sqrt() and max() math functions with programming.
 - d. Elaborate conditional statements used in embedded system programming.
 - e. Explain the basic structure-function used for embedded programming.
 - f. Discuss the following pins of the Arduino circuit
 - i) USB plug
 - ii) Serial In and Out (RX and TX)

4. Attempt any three of the following: 15
- a. Explain the following temperature sensors
 - i) Thermocouples
 - ii) RTDs
 - b. Describe the operation of the gas sensor.
 - c. Write a short note on the line tracker sensor.
 - d. Discuss the digital infrared motion sensor in an embedded system.
 - e. Explain the role of DHT sensors in embedded systems.
 - f. Write a short note on LDR.

5. Attempt any three of the following: 15
- a. Explain the smart parking system with its challenges.
 - b. Explain the importance of an Air quality monitor using an Arduino circuit.
 - c. Write a short note on the traffic management system.
 - d. Write a study report on Smart Home Energy Monitor.
 - e. Write the concept behind the Development of a Fire Fighting Robot using Arduino.