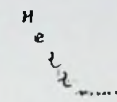Max Time: 2½ hrs. Max Marks: 75

<u>Instructions:</u>
1) All questions are **compulsory**.
2) Mixing of sub questions are not allowed.
3) Write in clear, legible, writings.

Q I Attempt any **three** (15)

A) Write a program in Java to print "HelloWorld" as

B) Write a program in Java to display the tables. The user will provide three values on the command line. The first and second are the start and end tables and the third value indicates how to what extent each table should be displayed.

C) Java is called as platform independent. Justify your answer.

D) Explain method overloading with examples.

E) Write a program in Java to create a class 'Square'. Define methods to return the area of a square and its perimeter. Create an array of 4 objects of the above class and show the usage of the above methods.

F) Write a program in Java to create a class 'Sphere'. Define methods to return the volume of a sphere. Override the 'toString' method to display the appropriate information. Create an object in main and show the usage of the above methods.

Q II Attempt any **three** (15)

A) Briefly explain method overriding along with an example.

B) Define a class 'Shape' with a method namely 'area' without the body; the method has one parameter that is used to compute area. Now create two classes 'Circle' and 'Square' overriding the method 'area' for printing its respective area. Create an object of class 'Circle' and 'Square'. Demonstrate polymorphism in the call to the method 'area' of each object.

C) Write a Java program with the following specifications. Create a class 'Vehicle'. It stores the weight and the manufacturing number (both data type is double). Provide Constructor to initialize the values. Define a method 'display' to display the details of the 'Vehicle' object. Derive three classes 'Airvehicle', 'Landvehicle' and 'Seavehicle' from the above class. It contains a variable to store the speed. Provide constructors and override the 'display' method. Derive a classes 'Military_air_vehicle', 'Passenger_air_vehicle' from 'Airvehicle'. 'Military_air_vehicle' contains a variable for range of fire, and 'Passenger_air_vehicle' contains a variable for capacity. Provide constructors and override the 'display' method.

D) Write a program in Java to create an interface containing methods to 'withdraw' and 'deposit' money in an account. Create two classes implementing the above interface to

1

encapsulate a saving account and a current account. Create their objects in main and demonstrate the usage of the methods and the concept of polymorphism.

E) The interface **Animal** has one method 'display'. Abstract classes **Bird** and **Reptile** implement Animal. Classes **Pigeon**, **Kite**, **Vulture**, **Penguin** and **Albatross** inherit Bird. Classes **Anaconda** and **Alligator** inherit Reptile. Define and implement all the above. Create one instances of each class and display "I am a... ".

F) Explain the use of keywords 'super' and 'this'.

Q III Attempt any **three**   (15)

A) Write a multithreaded program in Java. One thread displays 'Pass!!' and the other thread displays 'Fails!!!'. ☺

B) Write a multithreaded program in Java which displays all prime numbers between two values. The output of each thread should not be mixed with the output of the other thread.

C) Can we handle multiple exceptions using a single catch block? Justify your answer with an example.

D) Write a program that creates two threads. Each thread is instantiated from the same class. It executes a loop with 10 iterations. Each iteration displays message, sleeps for 200 milliseconds.

E) Explain the need for packages in Java. Describe how to create a package and access the classes in a package with an example.

F) Explain life cycle of thread in Java with a neat labeled diagram.

Q IV Attempt any **three**   (15)

A) Develop a frame that has three radio buttons Yellow, Green, Blue. On Click of any one of them background color of the frame should change accordingly.

B) Explain the features of JFC.

C) What is the use of adapter class in Java? Explain any one of the adapter classes defined in Java.

D) What is the role of layout manager? Explain the BorderLayout.

E) How the concept of inner classes helps in Java to handle events? Explain with the help of interface KeyListener.

F) Explain Text-Entry components in Java.

Q V Attempt any **three**   (15)

A) Briefly describe the 'FileChooser' component in Java.

B) Explain the 'Tree' component in Java.

C) Explain how you create a combobox component in Java with an example.

D) Explain the various types of ResultSet objects in JDBC.

E) Explain the steps of using a database in a Java program.

F) Write a code snippet to show how a select query is fired and how the records are displayed in a Java program.

Introduction to Embedded System

Instructions:
1) **All** questions are **compulsory.**
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt any three: (15)
   A) Differentiate general purpose computing system & embedded systems.
   B) Explain the brief history of Embedded system
   C) Give a classification of embedded systems.
   D) Explain the applications of Embedded System.
   E) Explain the use of data communication in embedded system.
   F) Explain the use of data storage in embedded systems.

Q2) Attempt any three: (15)
   A) Explain the working of washing machine in embedded system.
   B) Explain the working of microprocessor with help of neat labelled diagram
   C) Explain the working of microcontroller in embedded system.
   D) Difference between microprocessor and microcontroller.
   E) Difference between RISC and CISC processor/controller.
   F) What is endiannes? Explain the types of endiannes.

Q3) Attempt any three: (15)
   A) What is Arduino? Explain different variants of Arduino
   B) Explain in brief about Arduino IDE
   C) Explain in brief about Digital I/O function
   D) Explain in brief about Analog I/O function
   E) Explain in brief about Advance I/O function
   F) Explain in brief about Math function

Q4) Attempt any three: (15)
   A) Stimulation to LED light blinking
   B) Photo resistor using Arduino
   C) Temperature sensor using Arduino
   D) Servo motor using arduino
   E) Ultrasonic sensor using arduino
   F) Traffic light using arduino

Q5) Attempt any three: (15)
   A) Air Quality Monitor Using Arduino
   B) A Fire-Fighting Robot Using Arduino
   C) Intelligent Lock System Using Arduino
   D) Explain the working of Wifi module
   E) Write a short note on GPRS/GSM
   F) Explain the working of infrared transmitter and receiver using block diagram

Computer Oriented Statistical Techniques

Instructions:
1) All questions are compulsory.
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt any three: (15)

A) Find the mode of the ages of the 112 people who live on a tropical island are grouped as follows:

Age group	Frequency (f_i)
0-10	40
10-20	53
20-30	58
30-40	64
40-50	72
50-60	49
60-70	36
70-80	25

B) Find the missing frequencies in the following distribution if it is known that the mean of thedistribution is 1.46

X	0	1	2	3	4	5	total
f	46	f_1	f_2	25	10	5	200

C) Calculate Q_1 and Q_3 from the following data

Marks	0-10	10-20	20-30	30-40	40-50
No.of students	8	7	5	12	28

D) Calculate D_3 and D_7 from the following data.

X	0-5	5-10	10-15	15-20	20-25
f	7	18	25	30	20

E) Find the Range and coefficient of range of following data.

i) 80,90,60,63,68,61,67,65,100,75,89,84,86

ii)

Class interval	45-49	50-54	55-59	60-64	65-69
Frequency	37	26	8	5	1

F) Find Quartile deviations and coefficient of QD for the following data

X	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
f	8	12	20	25	15	9	6	5	5

Q2) Attempt any three: (15)

A) Given $Q_1 = 21.9$, $Q_2 = 37.5$, $Q_3 = 61.5$. find S_k.

B) f pair of dice is thrown and X denotes the sum of the number the sum of the numbers on them. Find the probability distribution of X. also find the Expectation of X.

C) Find the first four moments abo Find $\{E_1\}$, $P\{E_2\}$ and $P\{E_1 + E_2\}$ by use of venn diagram shown in figure.
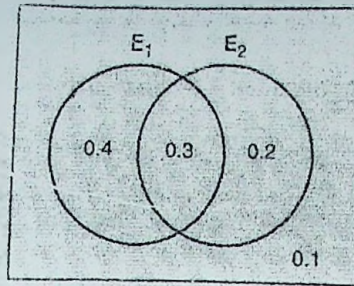
D) Let U_1 be a variable that stand for any of the elements of the population 4,5,6 and U_2 be a variable that stand for any of the elements of the population 8,9. Compute

i) μ_{U_1} ii) μ_{U_2} iii) $\mu_{U_1-U_2}$ iv) σ_{U_1} v) σ_{U_2} iv) $\sigma_{U_1-U_2}$

E) A population consists of the five numbers 3,4,7,9 and 12. Consider all possible sample of size 2that can be drawn with replacement from this population find:

(a) Mean of population   (b) the standard deviation of population

(c) the mean of sampling distribution of means (d)the standard deviation of the mean of sampling distribution of mean

F) A random variable X has the following probability distribution value of X

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Find each of the following (A) k (b)p(X<6)   (c)P(X≥ 6)   (d)P(0<X<5)

Q3) Attempt any three: (15)

A) A survey of 40 retired women revealed the mean age at which their income was maximum to be 45 years with a standard deviation of 6.3 years. Find 95% confidence limit for the mean age of maximum earnings of women who survive till they retire. (hint: 1.96)

B) For a given sample of 100, 35 are working as a professor. Construct a 95% confidence interval for the probability that almost of the education people from the samples working as a professor. (hint: 1.96)

C) Explain the terms: a) Hypothesis   b) Null Hypothesis   c) Alternative Hypothesis
        d) Level of significance   e) critical region   f) Types of error.

D) A random sample of 400 tins of vegetables oil of labeled 5 kg net weight gave a mean net weight of 4.93 kg with a standard deviation of 0.22 do we reject the hypothesis of net weight 5 kg per tin on the basis of this sample at 1% level of significance. ($t_\alpha = 2.58$)

E) The mean lifetime of a sample of 100 fluorescent light bulbs produced by a company mean is found to be 1570 hours with a standard deviation 140 hour test the hypothesis that the mean lifetime bulbs produced by the company is 1600 hours the alternative hypothesis that it is less than 1600 at 5% of level of significance.   ($t_\alpha = 1.64$)

F) write the short note on null hypothesis.

Q4) Attempt any three: (15)

A) A large consignment of bat is assumed to have 20% substandard bat. A sample of 400 bats is selected from it. Find the probability that percentage of substandard bats in the sample D

(i) at most 16% (ii) at least 22% (iii) between 18% to 22% . [P(0 < t < 1) = 0.3413 ,P(0<t<2)=0.4772]

B) 20% of apples in a large consignment are found to be bad. Find the probability that atleast 25% apple are bad in a sample size 400 drawn from it. [P(0< t < 2.5) = 0.4938]

C) write the properties of chi-square test.

D) Data represent the last digit of the scooter passing at a certain traffic signal; observe during last one hour for 180 scooter.

Last Digit	0	1	2	3	4	5	6	7	8	9
Frequency	12	20	14	12	21	18	17	26	19	21

Claim that all the digits one equally like to a occurs 5% level of significance? ($\chi^2_{(9,0.05)} \leq 16.9$)

E) In an experiment on immunization of cattle from tuberculosis the following results were obtained.

	Affected	Unaffected
Inoculated	11	31
Not inoculated	14	4

Examine the effective of vaccine in control the incidence of the diseases at 1% level of significance. ($\chi^2_{(1,0.01)} \leq 6.635$)

F) If x is a chi-square variate with standard deviation 4. Find the mean, median and the mode x.

Q5) Attempt any three: (15)

A) (a)construct a straight line that approximates the data of below table

(b) find the equation for this line

X	2	3	5	7	9	10
Y	1	3	7	11	15	17

B) (a)show that the equation of a straight line that passes through the points (x_1 , y_1) and (x_2 , y_2) is

given by $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$

(b) find the equation of straight line passing through the points (2,-3)and (4,5)

C) fit a least squares line to the data, regression line of y on x

X	1	3	4	6	8	9	11	14
Y	2	4	5	6	7	10	9	12

D) Draw the scatter diagram for the data and state the type of correlation between variables

(i)

X	3	4	5	8	7	9	6	2	1
y	6	3	4	7	9	8	6	1	2

(ii)

X	4	8	7	6	1	3	5	2
y	30	10	20	60	80	40	25	75

(iii)

X	10	20	30	40	50	60
y	50	10	35	20	40	55

E) If for bivariate data $\sum xy = 7.8 , \sum x^2 = 10 , \sum y^2 = 8$, than find correlation coefficient.

F) Find the equation for the straight line whose slope is 2/3 and whose y intercept is -3.

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Max Time: 2½ hrs   SYIT Semester IV   Max Marks: 75

<Software engineering>

Q 1) Attempt any three: (15)
A.   Draw and explain the waterfall model and state the disadvantage .
B.   Draw and explain the RAD model.
C.   What is software engineering? Explain the principles of software engineering.
D.   Explain non functional requirements in detail.
E.   Explain the responsibility of an agile project manager.
F.   Write a short note on extreme programming.

Q2) Attempt any three: (15)
A.   What is the socio-technical system? Explain the essential characteristics of the socio
-technical system.
B.   Write a short note on legacy systems.
C.   What is requirement engineering? Explain the necessity of requirement validation.
D.   Explain Behavioral model in detail.
E.   Explain critical systems and their types in detail.
F.   What is system engineering? Explain emergent system properties.

Q3) Attempt any three: (15)
A.   What is software project management? Explain project planning.
B.   Explain the risk management process in detail.
C.   Give difference between quality assurance and quality control.
D.   What is the need of user interface design?
E.   State and brief the UI design principles.
F.   Explain software design and its phases.

Q4) Attempt any three: (15)
A.   Explain the software inspection process in detail.
B.   Explain function oriented metric.
C.   Explain automated static analysis.
D.   Explain the COCOMO model in detail.
E.   Give the difference between software verification and validation.
F.   What is acceptance testing? give the difference between alpha testing and beta
testing.

Q5) Attempt any three: (15)
A.   Draw and explain CMMI process improvement framework.
B.   Explain software reuse with its types.
C.   Write a note on reuse landscape.
D.   What are the issues of distributed systems? Explain in detail
E.   Explain service engineering in detail.
F.   Write a note on service oriented software engineering.

Computer Graphics and Animation

Instructions:
1) All questions are compulsory.
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt any three: (15)
   A) Explain the term computer graphics and its applications
   B) Explain the construction and working of Cathode Ray Tube (CRT)
   C) State and explain DDA line drawing algorithm.
   D) Write short note on Raster Scan Display
   E) Write short note on Random Scan Display
   F) Write a short note on Beam Penetration Method

Q2) Attempt any three: (15)
   A) Explain 2D Reflection Transformation and give the matrix representations
   B) Explain Axonometric Projections and its types
   C) Write a short note on Perspective projections.
   D) Explain the following 3D Transformations and give their matrix representations:-
      i.   Translation   ii.   Scaling
   E) Explain the concept of Vanishing Points in brief
   F) Magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to twice its size and rotate by 90 degrees in anticlockwise direction

Q3) Attempt any three: (15)
   A) Explain the following terms in relation to Color Appearance:- Hue, Brightness, Saturation
   B) Write a short note on Chromatic Adaptation
   C) Explain Grassman's law in detail
   D) Write a short note on XYZ color space
   E) Explain the RGB color model
   F) Explain the procedure for specifying an arbitrary 3D view. Give examples of 3D viewing

Q4) Attempt any three: (15)
   A) Explain the different Techniques for efficient Visible-Surface Algorithms
   B) Write a short note on Back face removal Algorithm
   C) Write a short note on Painter's Algorithm
   D) Write a short note on Visible-Surface Ray Tracing
   E) Write a short note on Scan-line method Algorithm
   F) Write a short note on Z-Buffer Algorithm.

Q5) Attempt any three: (15)
   A) Explain the different types of Deformations
   B) Explain the following principles of animation:- Ease In and Out (or Slow In and Out), Follow Through and Overlapping Action
   C) Explain the different physics based animations:- particle system, fluid dynamics
   D) Explain the following principles of animation:- Follow Through and Overlapping Action, Solid Drawing
   E) Explain the different physics based animations:- rigid body, flexible dynamics
   F) Explain the different types of Image compression:- lossy and lossless