

Question Paper Set of

S.Y.B.SC.IT. – Sem-IV

Regular College Exam

April, 2018

Extra.

(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

- What is computer graphics? How image is displayed on video display device?
- Explain the method of circle drawing using midpoint circle algorithm.
- Distinguish between active and passive graphics devices.
- What are the various problems of aliasing? Explain with example.
- Explain different types of video formats.
- Explain the acceptance and rejection test using bit codes in Cohen-Sutherland line clipping algorithm.

2. Attempt any three of the following:

15

- Perform mapping from window to viewport coordinate transformation.
- Using homogeneous coordinate transformation matrix, apply following sequence of transformation to a unit square centered at origin.
 - Translation by factor (1,1)
 - Rotation by angle $\theta = 90^\circ$
- Obtain the general combined matrix for scaling about an fixed point P(xf,yf).
- Write a note on affine and perspective geometry.
- Explain projection with the help of orthographic projection.
- 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

- What is viewing? Explain canonical view volume.
- Explain camera model and viewing pyramid with diagram.
- Explain different properties of Bidirectional Reflectance Distribution Function (BRDF).
- Write a note on photometry.
- Explain Grassmann's laws.
- What is colorimetry? Explain color with the help of colorimetry.

[TURN OVER]

15

4. Attempt any three of the following:

- Explain z-buffer algorithm with advantages and disadvantages.
- What are the basic tests in Warnock's algorithm? Explain.
- Explain parametric representation of ellipse with example.
- Write a note on B-Spline curves.
- Compare all visible surface detection methods.
- Construct Bezier curve of order 3, with 4 polygon vertices A(1,1) B(2,3) C(4,3) D(6,4) for values of $u, 0 \leq u \leq 1$ where $p(u)$ is a point on curve with values for $u = (0, 1/4, 1/2, 3/4, 1)$.

15

5. Attempt any three of the following:

- What is an image? Explain different file formats of an image.
- What is an animation? Explain character animation.
- Explain the concept of median filtering with suitable example.
- Distinguish key frame animation with procedural animation.
- Explain different types of deformation.
- Explain JPEG compression process in detail.

(2½ hours)

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1. Attempt any three of the following:

15

- Define software engineering. Explain the Software Development Life Cycle (SDLC) steps in brief.
- Explain the classification of the software requirements.
- What are the components of software process? Explain.
- Explain the structure of software requirement document.
- Write short note on spiral model.
- What are the principles of agile method?

2. Attempt any three of the following:

15

- State and explain the emergent systems properties with example.
- What is legacy system? Explain it with the help of diagram.
- Explain the simple critical system with suitable example.
- Explain the importance of feasibility study in requirements engineering process.
- Write short note on
 - Context model.
 - Object model.

- Explain requirement validation process checks on the requirements in the requirement document.

3. Attempt any three of the following:

15

- Write short note on architectural design decisions.
- Write short note on modular decomposition styles.
- Explain user interface design process with the help of diagram.
- Explain the risk management process.
- Write short note on project scheduling.
- What is quality assurance? What are the quality standards types? Explain.

4. Attempt any three of the following:

15

- Define verification and validation. Explain software inspection in v & v process.
- Write short note on component testing.
- Explain the test automation.
- Write short note on Function Point (FP) and Line of Code (LOC) measures.
- Explain the Cost Constructive Model (COCOMO) with the formula for computing duration of project and manpower efforts for project.
- Explain the software cost estimation technique.

[TURN OVER]

5. Attempt any three of the following:

- a. Describe the classification of process.
- b. Explain the CMMI process improvement framework.
- c. Explain the services as a reusable components.
- d. Explain the application framework.
- e. Write short note on commercial-off-the-shelf (COTS) product reuse.
- f. What are the architectural patterns for distributed systems? Explain Master-Slave architecture.

(Time: 2½ Hours)

[Total Marks: 75]

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a. The following table gives the heights of 100 students at XYZ College. Find the mean height of the students.

Height (in)	No. of Students
60-62	5
63-65	18
66-68	42
69-71	27
72-74	8
	100

b. During one year the ratio of milk prices per quart to bread prices per loaf was 3.00, whereas during the next year the ratio was 2.00.

i. Find the arithmetic mean of these ratios for the 2-year period.

ii. Find the arithmetic mean of the ratios of bread prices to milk prices for the 2-year period.

iii. Discuss the advisability of using the arithmetic mean for averaging ratios.

iv. Discuss the suitability of the geometric mean for averaging ratios.

c. Two variables, X and Y, assume the values $X_1 = 2, X_2 = -5, X_3 = 4, X_4 = -8$ and $Y_1 = -3, Y_2 = -8, Y_3 = 10, Y_4 = 6$, respectively. Calculate:

$$i. \sum XY, \quad ii. \sum X \sum Y, \quad iii. \sum XY^2, \quad iv. \sum X^2, \quad v. \sum (X - Y)(X + Y)$$

d. On a final examination in statistics, the mean grade of a group of 150 students was 78 and the standard deviation was 8.0. In algebra, however, the mean final grade of the group was 73 and the standard deviation was 7.6. In which subject was there the greater (i) absolute dispersion and (ii) relative dispersion?

e. State and explain the properties of standard deviation.

f. For a group of 200 candidates, the mean and standard deviation of scores were found to be 40 and 15 respectively. Later on, it was discovered that the scores 43 and 35 were misread as 34 and 53 respectively. Find the corrected mean and standard deviation corresponding to the corrected figures.

[TURN OVER]

2. Attempt any three of the following:

- a. Find the (i) first, (ii) second, (iii) third and (iv) fourth moments about the mean of the set 2, 3, 7, 8, 10.
- b. In a frequency distribution the co-efficient of skewness based upon the quartiles is 0.6. If the sum of the upper and lower quartiles is 100 and median is 38, find the value of the upper and the lower quartiles.
- c. In a survey of 500 adults were asked the three-part question (1) Do you own a cell phone, (2) Do you own an ipod, and (3) Do you have an internet connection? The results of the survey were as follows (no one answered no to all three parts):
 cell phone 329 cell phone and ipod 83
 ipod 186 cell phone and internet connection 217
 internet connection 295 ipod and internet connection 63
 (i) answered yes to all three parts, (ii) had a cell phone but not an internet connection, (iii) had an ipod but not a cell phone, (iv) had an internet connection but not an ipod, (v) had a cell phone or an internet connection but not an ipod and, (vi) had a cell phone but not an ipod or an internet connection.
- d. One bag contains 4 white balls and 2 black balls; another contains 3 white balls and 5 black balls. If one ball is drawn from each bag, find the probability that (i) both are white, (ii) both are black, and (iii) one is white and one is black.
- e. Assume that the heights of 3000 male students at a university are normally distributed with mean 68.0 inches (in) and standard deviation 3.0 in. If 80 samples consisting of 25 students each are obtained, what would be the expected mean and standard deviation of the resulting sampling distribution of means if the sampling were done (i) with replacement and (ii) without replacement? Give the interpretation of the result.
- f. Five hundred ball bearings have a mean weight of 5.02 grams (g) and a standard deviation of 0.30 g. Find the probability that a random sample of 100 ball bearings chosen from this group will have a combined weight of (i) between 496 and 500 g and (ii) more than 510 g. (Use the table of area under normal curve from 0 to z).

3. Attempt any three of the following:

- a. In measuring reaction time, a psychologist estimates that the standard deviation is 0.05 seconds (s). How large a sample of measurements must he take in order to be (i) 95% and (ii) 99% confident that the error of his estimate will not exceed 0.01 s?
- b. A measurement was recorded as 216.480 grams (g) with a probable error of 0.272 g. What are the 95% confidence limits for the measurement?
- c. A sample poll of 100 voters chosen at random from all voters in a given district indicated that 55% of them were in favor of a particular candidate. Find the (a) 95%, (b) 99%, and (c) 99.73% confidence limits for the proportion of all the voters in favor of this candidate.
- d. Explain Type I and Type II errors and Level of Significance.
- e. The breaking strengths of cables produced by a manufacturer have a mean of 1800 pounds (lb) and a standard deviation of 100 lb. By a new technique in the manufacturing process, it is claimed that the breaking strength can be increased. To test this claim, a sample of 50 cables is tested and it is found that the mean breaking strength is 1850 lb. Can we support the claim at the 0.01 significance level?

[TURN OVER]

- f. Two groups, A and B, consist of 100 people each who have a disease. A serum is given to group A but not to group B (which is called the control); otherwise, the two groups are treated identically. It is found that in groups A and B, 75 and 65 people, respectively, recover from the disease. At significance levels of (a) 0.01, (b) 0.05, and (c) 0.10, test the hypothesis that the serum helps cure the disease. Compute the p-value and show that $p\text{-value} > 0.01$, $p\text{-value} > 0.05$, but $p\text{-value} < 0.10$.

4. Attempt any three of the following:

15

- a. A random sample of 10 boys had the following I.Q.s :

70, 120, 110, 101, 88, 83, 95, 98, 107, 100.

Do these data support the assumption of a population mean I.Q. of 100? Find a reasonable range in which most of the mean I.Q. values of samples of 10 boys lie.

- b. Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variances are equal, against the alternative that they are not, at the 10% level. [Assume that $P(F_{10,8} \geq 3.35) = 0.05$ and $P(F_{8,10} \geq 3.07) = 0.05$]

- c. The standard deviation of the heights of 16 male students chosen at random in a school of 1000 male students is 2.40 in. Find the (i) 95% and (ii) 99% confidence limits of the standard deviation for all male students at the school.

- d. Calculate the chi-square value for the following data:

Colour	Red	Green	Yellow
Observed Frequency	12	16	20
Expected Frequency	16	8	15

- e. Acme Toy Company prints baseball cards. The company claims that 30% of the cards are rookies, 60% veterans but not All-Stars, and 10% are veteran All-Stars. Suppose a random sample of 100 cards has 50 rookies, 45 veterans, and 5 All-Stars. Is this consistent with Acme's claim? Use a 0.05 level of significance. (Use chi-square goodness of fit). Given $P(\chi^2 \geq 19.58) = 0.0001$.

- f. A survey of 320 families with 5 children each revealed the following distribution:

Boys	5	4	3	2	1	0
Girls	0	1	2	3	4	5
No of families	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally probable?

[TURN OVER]

5. Attempt any three of the following:

- a. Fit an exponential curve of the form
- $Y = ab^x$
- to the following data:

x	1	2	3	4	5	6	7	8
Y	1.0	1.2	1.8	2.5	3.6	4.7	6.6	9.1

- b. The weights of a calf taken at weekly intervals are given below. Fit a straight line using the method of least squares and calculate the average rate of growth, per week.

Age (X)	1	2	3	4	5	6	7	8	9	10
Weight (Y)	52.5	58.7	65.0	70.2	75.4	81.1	87.2	95.5	102.2	108.4

- c. Fit a second-degree parabola to the following data taking X as the independent variable:

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

- d. Find the coefficient of linear correlation between the variables X and Y presented in Table below:

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

- e. In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible:

Variance of $X = 9$, Regression equations: $8X - 10Y + 66 = 0$, $40X - 18Y = 214$

Find (i) Mean values of X and Y . (ii) the correlation coefficient between X and Y . (iii) the standard deviation of Y .

- f. Find the equations of lines of regression for the following data:

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

Obtain the estimate of X for $Y = 70$.

(Time: 2½ hours)

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1. Attempt any three of the following:

15

- Distinguish between general purpose system and embedded systems.
- List three applications of embedded systems. Discuss any one in detail.
- Briefly explain function of the following. Also give on example each
 - PLD
 - COTS
- What is use of a stepper motor in an embedded system? Explain different types of stepper motors.
- Discuss characteristics of embedded systems.
- What are operational quality attributes of embedded system?

2. Attempt any three of the following:

15

- Explain the difference between domain specific and application specific embedded system. Give two examples of each.
- What is role of display panel in a washing machine? What inputs can be accepted from user in a washing machine display interface?
- What is memory map? Explain the interrupt map for embedded system
- What are different types of memory? Explain each in brief.
- Explain the function of control and status register. Give example.
- Write a note on watchdog timer.

3. Attempt any three of the following:

15

- With neat block diagram explain the components of 8051 microcontroller.
- Draw the pinout diagram and explain functions of pins of 8051 microcontroller.
- What is the need of interfacing external memory with 8051 microcontroller? How is the interfacing done?
- Write a note on data types in embedded C.
- Explain how time delay is calculated using 8051 microcontroller? Write code segment to support your explanation.
- Demonstrate the use of bitwise operator in embedded C.

[TURN OVER]

4. Attempt any three of the following: 15
- What are the factors to be considered in selecting a microcontroller for embedded system? Discuss any one in detail.
 - Explain the steps in designing an embedded system using 8051 microcontroller.
 - List and explain in brief the features of 8051 microcontroller.
 - With required example explain structure of embedded system program.
 - Explain what is meant by the super loop based approach.
 - What are different types of files created in the process of burning a program onto IC.
5. Attempt any three of the following: 15
- Define operating system kernel. What are services provided by kernel?
 - Distinguish between Real Time operating system and general purpose operating system.
 - List and explain the functional requirements to be considered in order to select the correct RTOS.
 - What are the components of IDE of embedded system development environment?
 - Explain following terms –
 Compiler
 Debugger
 Disassembler
 Emulator
 Simulator
 - Write a note on current trends in embedded industry.

SYBSC-IT Sem-IV

Extra

24/04/18

Q.P. Code: 36158

(Time: 2½ hours)

Total Marks: 75

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1. Attempt any three of the following:

- Write a short note on Java Virtual Machine (JVM).
- Write in detail about different types of operators in Java, category-wise quoting their functionality, operands and return type. Give one example statement for each.
- What are the primitive data types in Java? Briefly explain their size, range and other details.
- Explain the terms : narrowing, widening, instantiation, auto boxing.
- Briefly explain: (i) Type annotations (ii) Lambda expressions.
- List and explain the the salient features of Java.

2. Attempt any three of the following:

- Write a short note on access specifiers in Java.
- Write a comparative note on overloading and overriding in Java.
- Explain the functionality of different types of iterative statements in Java using suitable examples.
- Explain : (i) Variable Arguments(Varargs) (ii) this.
- Demonstrate the behavior of static members in Java using a suitable example.
- Explain the semantics and functionality of the given statements :
 - Rectangle rec = new Rectangle(a,b);
 - break out;
 - public static void main(String arg[]) {.. }

3. Attempt any three of the following:

- Differentiate between abstract class abstract class and interfac in Java.
- What is an inheritance? Explain multiple inheritance in Java.
- Explain the terms/keywords : final , finally , finalize()

[TURN OVER]

- d. Explain the below given code and the concept(s) it represents :
 Shape gen = new Shape();
 Rect r = new Rect(); Circ c = new Circ();
 int k = Integer.parseInt(args[0]);
 if (k==1) gen = r; else gen=c;
 gen.showdata();
- e. How do you create your own package and import it in a Java program? Explain the procedure step-wise using a suitable example.
- f. Explain the below given code fragments :
 (i) interface values extends demoval { ... }
 (ii) class sample extends dsamp implements dval { .. }

4. Attempt any three of the following:

15

- a. What is a vector? List out any five vector methods and quote their functionality. Write one example for each.
- b. Explain life cycle of thread with a neat labeled diagram.
- c. Explain any 3 different cases of exception handling.
- d. Explain the semantics and functionality of the given statements :
 (i) FileReader ins = new FileReader(inf);
 (ii) dos.writeDouble(27.36);
- e. Explain the difference between the following using a suitable example.
 (i) equals(), compareTo(), equalsIgnoreCase()
 (ii) substring(k), subtring(k, j)
 (iii) Indexof('x'), lindexof('x', n);
- f. Explain :
 (i) int k = Integer.parseInt(num);
 (ii) val = lval.longValue();
 (iii) dval = Double.valueOf(s);

5. Attempt any three of the following:

15

- a. Briefly explain: delegation model, event, event listeners, and event sources.
- b. What is an Applet? Explain its life cycle in Java.
- c. What is a layout manager? Explain any two layouts.
- d. Write about: Button, Textfield, and Label controls.
- e. Explain the semantics and functionality of the given statements :
 (i) public void paint(Graphics g) { ... }
 (ii) b.addActionListener(this);
 (iii) repaint();
- f. Explain <APPLET> and <PARAM> tags with their attributes.
