

Roll No. ....

Total Pages: 1

**PUT November 2023**  
**BCA- III Semester**

**Software Engineering (GEC-DS-2)**

**Max Marks: 75**

**Time: 3 Hrs**

**Instructions:**

1. It is compulsory to answer all the questions (1.5 mark each) of Part-A in short.
2. Answer any four out of six questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

1. (a) What do you mean by size estimation? [CO-2](1.5)  
(b) What are the test cases? [CO-1] (1.5)  
(c) What is data dictionary? [CO-1] (1.5)  
(d) What do you mean by software crisis? [CO-4] (1.5)  
(e) What is cohesion? [CO-2] (1.5)  
(f) What is the relation between design and implementation? [CO-3] (1.5)  
(g) How is software different from a program? [CO-1] (1.5)  
(h) What are the disadvantages of waterfall model? [CO-2] (1.5)  
(i) What is meant by software prototyping? [CO-4] (1.5)  
(j) What are the differences between functional and non-functional requirements? [CO-4] (1.5)

**PART-B**

- 2.(a) What are the characteristics of a good software requirement specification (SRS) Document? [CO-1] (10)  
(b) Explain the role of management in software development. [CO-4] (5)
3. Write short note on following.  
(a) Halstead's software science measures [CO-3] (8)  
(b) Reverse Engineering [CO-4] (7)
- 4.(a) Discuss in detail the FAST method of Requirement elicitation with an example. [CO-2] (5)  
(b) What is Coupling? Explain the various types of the coupling. [CO-3] (10)
5. What do you understand by the term Software Development Life Cycle? Sketch a neat diagram of spiral model of software life cycle and hence explain it. [CO-1] (15)
- 6.(a) What is the use of software development process models? Explain the waterfall model. [CO-1] (10)  
(b) Is it possible to estimate software size before coding? Justify your answer with an example. [CO-2] (5)
7. What is requirement elicitation? Explain the various techniques of requirement elicitation. [CO-3] (15)

November 2023  
BCA III

ENVIRONMENT SCIENCE [BCA-17-204(B)]

Time: 3 Hrs

Max Marks: 50

**Instructions:**

1. It is compulsory to answer all the questions (1 mark each) of Part-A in short.
2. Answer any four out of six questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

- |  |            |
|--|------------|
| 1. (a) What are In-situ and Ex-situ conservation strategy. | [CO-1](1)  |
| (b) What is water logging?                                 | [CO-2] (1) |
| (c) What is BOD?   | [CO-3] (1) |
| (d) What do you understand by the term Environment?        | [CO-4] (1) |
| (e) Briefly describe the Chipko Movement.                  | [CO-2] (1) |
| (f) Draw the pyramid of biomass for aquatic ecosystem.     | [CO-3] (1) |
| (g) What is photochemical smog?                            | [CO-4] (1) |
| (h) What do you understand by Nuclear Holocausts?          | [CO-2] (1) |
| (i) List two green house gases.                            | [CO-5] (1) |
| (j) What is the role of ozone layer?                       | [CO-5] (1) |

**PART-B**

- |   |                 |
|---|-----------------|
| 2. (a) Describe Solid Waste Management and its strategies.  | [CO-1] (5)      |
| (b) Write a note on Biological Magnification and Eutrophication.  | [CO-1] (5)      |
| 3. (a) What is Deforestation and describe it's causes and effects?                                      | [CO-2] (5)      |
| (b) Define Biodiversity and it's levels and benefits.   | [CO-2] (5)      |
| 4. (a) Differentiate between Abiotic and Biotic components.   |                 |
| (b) Differentiate between Renewable and Non-Renewable resources.  | [CO-2] (2*5=10) |
| 5. (a) Why Environmental education is essential and what are the objectives of environmental education? | [CO-2](5)       |
| (b) What is Greenhouse Effect? What are the causes of global warming?                                   | [CO-3] (5)      |
| 6. (a) What is Effect of ozone depletion on environment?  | [CO-4] (5)      |
| (b) Introduce Natural Resources of Energy and classify them.  | [CO-4] (5)      |

7. (a) What do you understand by Sustainable Development and it's strategies? [CO-5] (5)
- (b) What are the major issues and problems related to rehabilitation of the displaced people? [CO-5](5)

November 2023  
BCA (DS) - III Semester

**MATHEMATICS III(BCA – DS -202)**

Time: 3 Hrs.

Max Marks: 75

**Instructions:**

1. It is compulsory to answer all the questions (1.5 mark each) of Part-A in short.
2. Answer any four out of six questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

1. (a) Define Random variable with example. [CO-1] (1.5)  
 (b) State any two properties of Distribution function. [CO-1] (1.5)  
 (c) Define Poisson distribution. [CO-1] (1.5)  
 (d) Define conditional density function for discrete random variable. [CO-2] (1.5)  
 (e) If  $X$  is a random variable and  $a$  and  $b$  are constants then  $E(ax + b) = a E(x) + b$ . [CO-2] (1.5)  
 (f) Find mean of the following data

|        |   |   |   |   |
|--------|---|---|---|---|
| $X$    | 0 | 1 | 2 | 3 |
| $F(x)$ | 7 | 9 | 8 | 5 |

- (g) Define Merits and Demerits of Geometric mean . [CO-3] (1.5)  
 (h) find  $E(X)$  for the given data [CO-3] (1.5)

|        |     |   |     |
|--------|-----|---|-----|
| $X$    | 2   | 3 | 4   |
| $P(x)$ | 1/2 | 2 | 1/3 |

- (i) Define Correlation coefficient. [CO-2] (1.5)  
 (j) Define Regression . [CO-4] (1.5) [CO-4] (1.5)

**PART-B**

2. (a) A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5 . calculate the proportion of days on which

- (i) neither car is used  
 (ii) the proportion of days on which some demands is refused . [CO-1] (10)

- (b) Ten coins are thrown simultaneously find the probability of getting at least seven heads . [CO-1] (5)

3. (a) Find marginal density function of  $X$  and  $Y$  and conditional density function of  $Y$  when  $X=x$  and conditional density function of  $X$  given  $Y=y$  for the joint p.d.f of two dimensional random variable.

$$f(x,y) = \begin{cases} x^2 + y^2 ; & 0 < x < 1, 0 < y < 2 \\ 0 & \text{elsewhere} \end{cases}$$

[CO-2] (8)

- (b) State and prove Addition theorem on Expectation . [CO-2] (7)

*ax + by = x + y*

4. (a) Find the mode of the following distribution.

| Class interval | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|----------------|------|-------|-------|-------|-------|-------|-------|-------|
| Frequency      | 5    | 8     | 7     | 12    | 28    | 20    | 10    | 10    |

[CO-3] (5)  
[CO-3] (10)

(b) Define primary data, its method of collection and its merits and demerits

5. Define joint probability mass function and conditional probability function and for the joint probability of two random variables X and Y given below.

| Y<br>X | 1    | 2    | 3    | 4    |
|--------|------|------|------|------|
| 1      | 4/36 | 3/36 | 3/36 | 1/36 |
| 2      | 1/36 | 3/36 | 3/36 | 2/36 |
| 3      | 5/36 | 1/36 | 1/36 | 1/36 |
| 4      | 1/36 | 2/36 | 1/36 | 5/36 |

[CO-2] (15)

i) find marginal distribution of X and Y.

ii) find conditional distribution of X given the value Y = 1.

6.(a) A computer while calculating correlation coefficients between two variables X and Y from 25 pairs of observations obtained the following results:

$n=25$ ,  $\sum x = 125$ ,  $\sum y = 100$ ,  $\sum xy = 508$ ,  $\sum x^2 = 650$ ,  $\sum y^2 = 460$  find correlation coefficients of the given data.

[CO-4] (5)

(b) 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 |

[CO-4] (10)

7. Define mean and its properties with its merits and demerits and Given the following frequency distribution. Calculate the arithmetic mean.

|                |         |         |         |         |         |           |         |         |         |
|----------------|---------|---------|---------|---------|---------|-----------|---------|---------|---------|
| Monthly wages  | 125-175 | 175-225 | 225-275 | 275-325 | 325-375 | 375-425 " | 425-475 | 475-525 | 525-575 |
| No. of workers | 2       | 22      | 19      | 14      | 3       | 4         | 6       | 1       | 1       |

[CO-3] (15)

$$\begin{aligned} \bar{x}y &= \sum uA + b \sum u^2 \\ \sum uA &= nA \end{aligned}$$

$$\frac{\frac{1}{n} \sum xy - \bar{x}\bar{y}}{\sqrt{\frac{1}{n} \sum x^2 - \bar{x}^2} \cdot \sqrt{\frac{1}{n} \sum y^2 - \bar{y}^2}}$$

Roll No. ....

**PUT November 2023**  
**BCA- III Semester**  
**Data Warehouse And Data Mining (BCA-DS-204)**

Max Marks: 75

Time: 3 Hrs

**Instructions:**

1. It is compulsory to answer all the questions (1.5 mark each) of **Part-A** in short.
2. Answer any four out of six questions from **Part-B** in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

- |   |              |
|---|--------------|
| 1. (a) Differentiate OLAP systems with typical OLTP systems ?   | [CO-1] (1.5) |
| (b) What is metadata repository in data warehousing?            | [CO-1] (1.5) |
| (c) What do you mean by Bitmap indexing?                        | [CO-4] (1.5) |
| (d) List out the types of metadata?                             | [CO-4] (1.5) |
| (e) What are lattice of cuboids ?                               | [CO-1] (1.5) |
| (f) How to generate association rules from frequent item sets ? | [CO-2] (1.5) |
| (g) What is k-means algorithm ?                                 | [CO-4] (1.5) |
| (h) Define the centroid of the cluster ?                        | [CO-3] (1.5) |
| (i) What is Decision tree?                                      | [CO-1] (1.5) |
| (j) List out the applications of data mining?                   | [CO-1] (1.5) |

**PART-B**

2. (a) Define data warehouse. Draw the architecture of data warehouse and explain the three tiers in detail? [CO-1] (10)  
 (b) What is multidimensional data model? Discuss the schemas for multidimensional data? [CO-2] (5)
  
3. (a) Explain in detail about the implementation of a data warehousing? [CO-2] (8)  
 (b) Describe various steps of KDD in detail. [CO-1] (7)
  
4. (a) How tuning and testing of data warehouse is performed? [CO-1] (5)  
 (b) What is data mining? Explain the steps in data mining process? [CO-3] (10)
  
5. (a) Define clustering? Why clustering is important in Data Mining? Write its uses? [CO-4] (10)  
 (b) How genetic algorithm approach assists in the process of classification? [CO-4] (5)
  
6. Consider a database, D, consisting of 9 transactions. Suppose min.support count required is 2 and let min.confidence required is 70%. Use the **apriori** and **Frequent pattern Growth** algorithm to generate all the frequent candidate itemsets Ci and frequent itemsets Li. [CO-4] (15)

| TID  | List of Items  |
|------|----------------|
| T100 | I1, I2, I5     |
| T200 | I2, I4         |
| T300 | I2, I3         |
| T400 | I1, I2, I4     |
| T500 | I1, I3         |
| T600 | I2, I3         |
| T700 | I1, I3         |
| T800 | I1, I2 ,I3, I5 |
| T900 | I1, I2 , I5    |

7. Write short note on the following (any three) :

- (a) Mining spatial databases.
- (b) Data Mining Query Language.
- (c) Time-Series Data mining.
- (d) Data Warehouse back-end tools.

[CO-4] (15)

**November 2023**  
**BCA- III Semester**  
**Introduction of Operating System**  
 (BCA-DS-206/ BCA-17-201)  
 Common for BCA (General & Data Science)

**Max Marks: 75****Time: 3 Hours****Instructions:**

1. It is compulsory to answer all the questions (1.5 mark each) of Part-A in short.
2. Answer any four out of six questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

1. (a) Explain the difference between Logical and Physical address. [CO-1] (1.5)  
 (b) Define Thrashing [CO-1] (1.5)  
 (c) What are file attributes [CO-4] (1.5)  
 (d) Explain difference between Internal and External Fragmentation. [CO-5] (1.5)  
 (e) Define Turn Around Time [CO-1] (1.5)  
 (f) What is Context Switch [CO-2] (1.5)  
 (g) Differentiate between LTS & STS [CO-5] (1.5)  
 (h) Mention the necessary conditions for Deadlock to occur. [CO-3] (1.5)  
 (i) What is Inter-Process Communication? [CO-1] (1.5)  
 (j) Why we use Multiprogramming? [CO-1] (1.5)

**PART-B**

2. (a) What is an Operating System? Explain Services provided by the Operating system. [CO-1] (10)  
 (b) Explain the different states of the process along with the process state transition diagram. [CO-2] (05)
3. Discuss the following in detail:
  - Real-time systems
  - Parallel systems
  - Inter-process communication.
4. (a) Consider Page Reference string 1,3,0,3,5,6,3,5,4. How many page faults while using FCFS, LRU and Optimal Page Replacement algorithm using 3 frames? [CO-3] (08)  
 (b) Explain Paging with an example. [CO-3] (07)
5. (a) Suppose that the following process arrive for execution at the time indicated.

| Process | Burst Time | Arrival time | Priority |
|---------|------------|--------------|----------|
| P1      | 8          | 0            | 3        |
| P2      | 4          | 1            | 2        |
| P3      | 1          | 4            | 1        |

What are the Average Waiting Time and Average Turnaround Time for these processes with:

- (i) Preemptive SJF (ii) Preemptive Priority Scheduling Algo. (iii) Round Robin Algo. (TQ=2)
- (b) Explain the CPU Scheduling criteria. [CO-2] (10)  
 [CO-2] (05)

6. (a) Consider the following disk request sequence for a disk with 100 tracks 45, 21, 67, 90, 4, 50, 89, 52, 61, 87, 25 (Current head position is 50). What is the total head movement needed to satisfy the requests for the following algorithms, FCFS, SSTF, SCAN, C-SCAN, and LOOK? [CO-4] (10)  
 (b) Differentiate between Contiguous and Indexed file allocation methods with merit and demerits [CO-4] (05)

7. (a) What is Banker's algorithm in the operating system? Why is this algorithm named so? [CO-5] (05)  
 (b) Considering a system with five processes P<sub>0</sub> through P<sub>4</sub> and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t<sub>0</sub> following snapshot of the system has been taken: [CO-5] (10)

| Process        | Allocation |   |   | Max |   |   | Available |   |   |
|----------------|------------|---|---|-----|---|---|-----------|---|---|
|                | A          | B | C | A   | B | C | A         | B | C |
| P <sub>0</sub> | 0          | 1 | 0 | 7   | 5 | 3 | 3         | 3 | 2 |
| P <sub>1</sub> | 2          | 0 | 0 | 3   | 2 | 2 |           |   |   |
| P <sub>2</sub> | 3          | 0 | 2 | 9   | 0 | 2 |           |   |   |
| P <sub>3</sub> | 2          | 1 | 1 | 2   | 2 | 2 |           |   |   |
| P <sub>4</sub> | 0          | 0 | 2 | 4   | 3 | 3 |           |   |   |

- i. What will be the content of the Need matrix?  
 ii. Is the system in a safe state? If Yes, then what is the safe sequence?

\*\*\*\*\*End of Question Paper\*\*\*\*\*

$$\begin{array}{r}
 \frac{8}{12} \\
 \frac{12}{6} \\
 \frac{4}{10} + \frac{8}{6} \\
 \{ \frac{12}{C} \\
 \frac{50}{96} \\
 \hline
 \frac{14}{6}
 \end{array}$$

$$\begin{array}{r}
 \frac{96}{41} \\
 \frac{50}{18}
 \end{array}$$

$$\begin{array}{r}
 \frac{50}{10} \\
 \frac{50}{96} + \frac{41}{18}
 \end{array}$$