(3 hours) **Total marks: 100**

Note:

1. **Q1 is compulsory**
2. **Attempt any Four from remaining Six questions**

Q.1(a)	Define constructor and destructor. Explain all types of constructor with suitable example.	10
(b)	Write a program which accepts 5 strings and sort them in ascending order.	10
Q.2(a)	Define Inheritance .Explain all types of inheritance with suitable example.	10
(b)	Differentiate function overloading and function overriding .Explain with suitable example.	10
Q.3(a)	Explain different components of Standard Template Library.	10
(b)	Explain file handling mechanism. Write a program which copy content from one file into another.	10
Q.4(a)	Define Operator overloading. Write a program which overload unary '--'and '++' operator.	10
(b)	Define and explain Function template and class template with suitable example.	10
Q.5(a)	Explain in C++ how we can handle Exception handling.	10
(b)	Define and explain constant variable and constant function with suitable example.	10
Q.6(a)	What is dynamic Binding? Demonstrate the use of New and Delete operator with suitable example.	10
(b)	Write a program which accepts a string from the user and find out number of words from that string.	10
Q.7	Write a short note on ***any four*** of the following 1. Inline Function 2. Recursive function. 3. Friend function 4. Default argument. 5. Static variable and static function.	20

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(3 Hours) **Total Marks: 100**

N.B. (1) Question No. 1 is compulsory.
(2) Attempt any four questions from Q.2 to Q.7.
(3) Answers to questions should be grouped and written together.
(4) All questions carry equal marks

Q.1 (a) A university registrar's office maintains data about the following entities: 10
(a)courses, including number, title, credits, syllabus, and prerequisites;
(b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
(c) students, including student-id, name, and program;and
(d) instructors, including identication number, name, department, and title.
Construct an E-R diagram for the registrars office. Document all assumptions that you make about the mapping constraints.

(b) Write the schema definition and normalize all the tables till 3NF 10

Q.2 (a) Given the following schema 10
Dept_master(Dept_no, Dept_name)
Emp_master(Emp_no, Emp_name, Emp_add, Joining_date, Dept_no, Salary)
i) List the Employee name and salary in descending order.
ii) List the Employee name whose salary is more than 30,000 and designation is manager
iii) List the employee name and Department name for those employees whose earning salary more than 50000
iv) List the Employee name which contains at least 2 occurrences of 'a' in their name.
v) List the name of employee who earning highest salary.

(b) What is serializability? Explain conflict equivalence and view equivalence 10

Q.3 (a) Explain architecture of DBMS. Describe the advantages of DBMS over file systems 10
(b) Define deadlock? Explain deadlock prevention techniques? 10

Q.4 (a) Explain Query optimization process in DBMS 10

(b) What is Bell la pedula model? Explain in detail 10

Q.5 (a) Suppose that we decompose the schema R = (ABCDE) into (ABC),(ADE). 10
Show that this decomposition is a lossless-join decomposition, if the following set F of functional dependency holds:
A->BC, CD->E, B->D, E->A
Also find out the candidate key.

(b) What is locking protocol? How 2 phase locking protocol is different from strict two phase locking protocol. 10

Q.6 (a) Differentiate between 10
i) Generalization and Specialization
ii) Physical Data Independence and Logical Data Independence

(b) Explain timestamp based protocol and how it is used to control concurrency 10

Q.7 Write a short note on the following(any four): 20
i) Candidate Key, Super Key and Primary key
ii) MVD
iii) Natural Join
iv) ACID properties of transaction.
v) Lossless and dependency preserving decomposition

MCA - Sem - III

(Time: 3 Hours) **Total Marks: 100**

N.B. : 1) Question No.1 is **compulsory.**
2) Attempt any **four** from the remaining **six** questions.
3) Figures to the right indicate full marks.

Q1. (a) Explain OSI Model with the functionalities of each layer in detail with neat diagram. [10]
(b) Explain CSMA, CSMA/CD and CSMA/CA in detail. [10]

Q2. (a) (i) Show how an error is detected using hamming code with example. [05]
(ii) Construct the cyclic redundancy code for the frame sequence 1101011011 and the generator is 10011. [05]
(b) Explain the stop- and-wait protocol in detail. [10]

Q3. (a) What is asymmetric key encryption? Explain RSA crypto system with suitable example. [10]
(b) Define Congestion. Explain different methods of handling congestion. [10]

Q4. (a) Discuss Ethernet standards in detail. [10]
(b) What is optimality principle? Explain shortest path routing with example. [10]

Q5. (a) What is ARP? Explain how the host get its physical address using ARP with a suitable example. [10]
(b) Discuss IPV4 frame format in detail. [10]

Q6. (a) Explain TCP connection establishment and termination in detail. [10]
(b) Discuss the IPV4 addresses with formats and special addresses [10]

Q7. Write Short notes on any **four** of the following: [20]
(a) ASK,FSK and PSK
(b) HTTP
(c) LEO, MEO, GEO
(d) Pure Aloha
(e) Wired media

Duration 3 hours **Total 100 marks**

N.B: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume any **necessary** data but justify the same.
(4) Figures to the **right** indicate **marks**.
(5) Use of scientific **calculator** is **allowed**.

1 a) XYZ farm is engaged in breeding cows. The cows are fed on various products grown on the farm. Because of the need to ensure certain nutrient constituents, it is necessary to buy additional one or two products, which we shall call A and B. The nutrient constituents (vitamins and proteins) in each unit of product are given below.

Nutrient Constituents	Nutrient Constituents		Minimum requirements of nutrient constituents
	A	B	
1	36	6	108
2	3	12	36
3	20	10	100

Product A costs Rs. 20 per unit and product B costs Rs 40 per unit. Determine how much of products A and B must be purchased so as to provide the cow nutrients not less than the minimum required, at the lowest cost. Solve the LP problem graphically. [10]

b) The following is the activity list of a project with time estimates [10]

Activity	Time(days)		
	Optimistic	Most likely	Pessimistic
1-2 (A)	6	6	24
1-3 (B)	6	12	18
1-4 (C)	12	12	30
2-5 (D)	6	6	6
3-5 (E)	12	30	48
4-6 (F)	12	30	42
5-6 (G)	18	30	54

Draw a network. Find expected duration and variance for each activity

What is the probability of the project is not being completed in 80 days?

[Given, for SNV, Z=0.69, area between mean and value of Z is 0.2549].

2 a) Solve the following LPP by simplex method. [10]

Maximize: $Z= 10x_1+6x_2+4x_3$

Subject to: $x_1+x_2+x_3 \leq 100$

$10x_1+4x_2+5x_3 \leq 600$

$2x_1+2x_2+6x_3 \leq 300$

$x_1, x_2, x_3 \geq 0$

b) Find the initial basic feasible solution of the following Transportation Problem by Least Cost Method. [10]

	To			
				Supply
From	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Demand	7	9	18	

3 a) Solve the following using big M method. [10]

Maximize $Z = 3x_1 - x_2$

Subject to the constraints $2x_1 + x_2 \leq 2$

$x_1 + 3x_2 \geq 3$

$x_2 \leq 4$

$x_1, x_2 \geq 0$

(b) The captain of a cricket team has to allot the five middle bating positions to five batsmen. The average runs scored by each batsman at these positions are as follows. [10]

Batsman	Batting Position				
	I	II	III	IV	V
P	40	40	35	25	50
Q	42	30	16	25	27
R	50	48	40	60	50
S	20	19	20	18	25
T	58	60	59	55	53

Find the assignment of batsmen to positions which will give the maximum number of runs.

4 a) Solve the LPP by Dual Simplex Method. [10]

Minimize $Z = 2x_2 + 5x_3$

Subject to $x_1 + x_2 \geq 2$

$2x_1 + x_2 + 6x_3 \leq 10$

$x_1 - x_2 + x_3 \geq 4$

$x_1, x_2, x_3 \geq 0$

b) Six jobs have to be processed at three machines A, B, C in order ACB. The time(in hrs) taken by each job on each machine is indicated below. [10]

Jobs	I	II	III	IV	V	VI
M/C A	12	8	7	11	10	5
M/C B	7	10	9	6	10	5
M/C C	3	4	2	5	5	4

Determine the sequence for the jobs so as to minimize the processing time. Determine the total elapsed and idle time of each machine.

5 a) Write short notes on the following. [10]
(i) Different costs associated with inventory problem.
(ii) Dual of a primal in LPP.

b) Solve using Gomory's cutting plane method. [10]

Maximize $z=x_1+2x_2$

Subject to: $3x_1+2x_2 \leq 5$

$x_2 \leq 2$

$x_1, x_2 \geq 0$ and integer.

6 a) Explain the following. [10]
(i) Branch and bound method of solving Traveling Salesman Problem.
(ii) Pure and mixed strategies in Game Theory.

b) The following mortality rates have been observed for a certain type of fuse. There are 1000 fuses in use, and it costs Rs 5 to replace an individual fuse. If all fuses were replaced simultaneously it would cost Rs 1.25 per fuse. It is proposed to replace all fuses at fixed interval of time, whether or not they have burnt out, and to continue replacing out fuses as and when they fail. At what interval the group replacement should be made? Also prove that this optimum policy is superior to the straightforward policy of replacing each fuse only when it fails. [10]

Week	1	2	3	4	5
% failing at the end of the week	5	15	35	75	100

7 a) A small assembly plant assembles PCs through 9 interlinked activities. The time duration for which is given below.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Duration	2	2	1	4	8	5	3	1	5	4	3

Draw a network for it. Tabulate total float, free float and independent float. [10]

b) Solve the following game by using the principle of dominance. [10]

		Player B					
		I	II	III	IV	V	VI
Player A	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
	3	4	3	7	-5	1	2
	4	4	3	4	-1	2	2
	5	4	3	3	-2	2	2

Sem-III / Paper / Subject Code: 56105 / Software Engineering / May-2019

(3 Hours) [Total Marks : 100 Marks]

Please check whether you have got the right question paper

Note: 1) Q1. is compulsory
2) Attempt any **Four** Questions from remaining **six** questions.

Q1. A) Explain the term Software Requirement Specification. Explain the features of good SRS. 10

B) Consider the database application with following information: 10
1) It has 5 screens with 5 views, 6 data tables for 3 servers and 4 clients;
2) It may generate 2 reports of 5 sections from 6 data tables for 2 servers and 3 clients.
3) There is 10% reuse of object points.
Developers experience and capability is low. Calculate object point count and new object point count and efforts to develop such a project.

Q2. A) Define SQA and explain Mc Call's software quality model in details. 10

B) Define module coupling and module cohesion. Also explain different types of coupling in detail. 10

Q3. A) Define staffing level estimation. Explain Rayleigh curve. Also state effect of schedule change on cost. 10

B) What are size metric? How function point metric is advantageous over LOC metric? Explain. 10

Q4. A) What is software engineering? Explain the role of management in software development. 10

B) Explain Degree of Rigor, Task set selector and Task network 10

Q5. A) Define software reliability. Explain different reliability metrics. Explain one reliability growth model. 10

B) Discuss various types of COCOMO . Explain phase wise distribution of effort. 10

Q6. A) Define proactive risk strategy. Explain how risk projection activity is performed. 10

B) What do you mean by system testing? List and explain different kinds of system testing. 10

Q7. Write Short notes on (any Four) 20
(a) Software Configuration Management
(b) Software reengineering
(c) DFD
(d) Art of debugging
(e) Make buy decision

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