

(3 Hours)

[Total Marks: 80]

NOTE: (1) Question No. 1 is Compulsory.

(2) Attempt any **three** questions from the remaining **five** questions.

(3) Answers to **sub-questions** should be **grouped** and written **together**.

- Q1** (a) What is operator Overloading? Write a class to handle fractions such as "1/3." 10
Overload + and - operators to add and subtract these fractions.
For example: $1/3 + 1/2 = 5/6$.
- (b) Explain the concept of multiple inheritance. What are ambiguities in multiple inheritance and how will you resolve them. 10
- Q2** (a) What are Programming Paradigms? Explain difference between Procedure Oriented and Object Oriented Programming. 10
- (b) What are constant Data Members and Constant functions? Explain with suitable example. 10
- Q3** (a) Write a class called Factorial. This class defines a method called factorial() which takes as its only parameter an int called n, and returns an int representing the factorial of n. The factorial of an integer n, denoted n! is defined as $n * (n - 1) * (n - 2) * \dots * 1$ (but note that $0!$ is 1). You MAY assume that n is a non-negative integer. 10
- (b) Explain use of ifstream, ofstream and fstream classes in detail with an example program of each. 10
- Q4** (a) Explain use of null, void and dangling pointer with an example of each. 10
- (b) Explain the concept of 1) Virtual Functions 2) Friend Functions 10
- Q5** (a) What are namespaces? Explain steps to create your own namespace with an example. 10
- (b) What are Strings? How will you create strings in C++? Explain various functions available in built in String class. 10
- Q6** Write short notes on any **four** :- 20
- (a) Bitwise operators in C++
 - (b) Class Templates
 - (c) Inline Functions
 - (d) File opening modes
 - (e) New and delete operator

(3 Hours)

Total Marks: 80M

- Please note: 1. Q.1 is compulsory.
2. Attempt any 3 out of remaining 5 questions.
3. Use of calculator is allowed.

- Q.1 a Consider a software project with 5 tasks T1- T5. Duration of the 5 tasks in days are 10, 10, 30, 40, 90 respectively. Task T2, T3 and T4 can start after T1, T5 can start after T2, T3 and T4. Draw the critical path and calculate slack time for non-critical activities. 10
- b Define requirements engineering. Explain requirement elicitation techniques. 10
- Q.2 a Define degree of rigor. Explain how degree of rigor is calculated based on TSS. 10
- b Explain project selection decision procedure. Also define project charter. 10
- Q.3 a Explain RAD model in detail. Compare it with incremental model. 10
- b Explain the procedure of project procurement. 10
- Q.4 a Assume that size of an organic software product has been estimated to be 28,000 LOC. Determine the efforts required to develop software product and development time. (Assume the constants: $a_1 = 2.4$, $a_2 = 1.05$, $b_1 = 2.5$ and $b_2 = 0.38$) 10
- b Define staffing level estimation. Explain Rayleigh Curve. 10
- Q.5 a Define software quality. Explain how FTR helps in software quality assurance. 10
- b Define project. Explain project phases with project life cycle. 10
- Q.6 a An application has the following: 15 low external inputs, 16 high external outputs, 20 low internal logical files, 15 high external interface files, 10 average external inquiries, and a value of complexity adjustment factor of 1.10. What are the unadjusted and adjusted function point counts? Assume following constants: low EI=3, high EO = 7, low ILF = 7, high EIF = 10. 10
- b Write a short note on (any two): 10
- Prototyping model
 - Reliability metrics
 - Tools and techniques for quality control

(3 Hours)

[Total Marks : 80]

- N.B. :**
- 1) Question No.1 is compulsory.
 - 2) Attempt **any three** from the remaining **five** questions.
 - 3) Answers to **sub-questions** should be grouped together.

- Q1. (a)** Discuss the use of Memory Buffer Register, Memory Address Register and Instruction Register in instruction execution. **05**
- (b)** Explain with an example, how are Karnaugh Maps useful in simplifying logic circuits. **05**
- (c)** Discuss the construction and working of a J-K Flip Flop. **05**
- (d)** Explain in brief memory hierarchy with a suitable diagram. **05**
- Q2. (a)** How are Cache Memories useful? Explain the cache organisation in detail with an example. **10**
- (b)** What are RAID's? Explain all RAID levels with their advantages and disadvantages. **10**
- Q3. (a)** Discuss the functions of an Input-Output module with its block diagram. **10**
- (b)** What is instruction pipelining? Discuss Six-stage instruction pipelining with and without branches. **10**
- Q4. (a)** Explain the construction and working of a static random access memory. **10**
- (b)** Discuss the organisation and working of a control unit in the CPU with its generic model. **10**
- Q5. (a)** Discuss various instruction addressing modes with suitable examples. **10**
- (b)** What is a Bus? Explain various bus interconnection schemes in detail with their architecture. **10**
- Q6. Write short note on any four of the following : 20**
- (a) Differentiate between RISC and CISC.
 - (b) De-Multiplexers.
 - (c) DMA.
 - (d) Clusters.
 - (e) Instruction cycle with interrupts.

Question No.1 is Compulsory

Attempt any Three Question between Question No.2 to 6

- Q 1.** A) Explain stepwise process to manage information technology internationally [10]
B) Explain classification and types of information system. [10]
- Q 2.** A) Explain IT Governance and E-Governance in detail? [10]
B) Describe different perspectives of Information system? [10]
- Q 3.** A) Explain how to improve business performance by using different types of Software and hardware platform. [10]
B) Explain impact of IT on new and modern organizations? [10]
- Q 4.** A) Explain Turnaround in IT strategic grid. [10]
B) Explain Roles of IT in E-commerce and M-commerce? [10]
- Q 5.** A) List and explain in detail Information system plan. [10]
B) Explain in Detail Management opportunities challenges and Solutions? [10]
- Q 6.** Write Short Notes(Any Four) [20]
A. Internet governance
B. Business Values of IT
C. Ethics and Information Technology
D. Prototype Development
E. Social responsibilities in IT

Duration: 3 Hrs

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N.B: (1) Question 1 is compulsory.

(2) Attempt any Three questions out of remaining Five questions.

(3) Assume any additional data, if required, but justify the same.

(4) Figures to the right indicate full marks for that question.

(5) Use of Scientific calculator is allowed.

Q.1) a) The Mean & standard deviation of 300 items are found to be 50 and 20 respectively. It is found that at the time of the calculation two items were wrongly taken as 7 and 52 instead of 15 and 26, Find the correct mean and Standard deviation. [5]

b) The probability that a person stopping at a petrol pump will ask for petrol is 0.8, will ask for water is 0.7 and for both 0.65. Find the probability that a person will ask for i) either petrol or water ii) neither petrol nor water iii) only petrol [5]

c) Calculate the model marks of the following [5]

Marks	10-30	30-50	50-70	70-90	90-110	110-130
No. of students	4	10	14	12	8	6

d) Find the missing frequency of the following [5]
if mode = 136 cms

Class interval	120-125	125-130	130-135	135-140	140-145	145-150
frequency	7	10	18	?	12	7

Q.2) a) The Joint probability density function of the two dimensional random variable (X,Y) is given by

$$f(x,y) = \begin{cases} 8/9xy, & 1 \leq x \leq y \leq 2 \\ 0, & \text{otherwise} \end{cases}$$

i) Find the marginal densities of X and Y.

ii) Find the conditional density function of Y given X=x and conditional density function of X given Y=y. [10]

Pritam.

b) Compute the inter quartile, semi-inter quartile range and coefficient of quartile deviation from the following data. [10]

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	65	45	120	25	90	80	120	60

Q.3) a) The age of husband and wives in seven couples were as follows: [10]

Age of husband	45	44	50	53	66	30	48
Age of wife	42	40	41	42	56	30	43

Find the Karl Pearson's coefficient of correlation between age of husband and age of wife.

b) A Man is equally likely to choose any one of the routes A,B,C from his house to railway station this choice of route A,B,C from his house to railway station and this choice of routes is not affected by whether. If whether is dry the probability of missing train by routes A,B,C are respectively $1/20, 1/10, 1/5$. He sets out on dry day and missed the train.

What is the probability that train chosen was C? [5]

c) The probability mass function of a random variable x is zero

Expect at the points $x=0, 1, 2$ At these points it has the values

$P(0)=3c^2, P(1)=4c-10c^2$ and $P(2)=5c-1$, for some $c>0$

i) Determine the value of c ii) Compute the $P(X<2)$ [5]

Q.4) a) Calculate Bowley's coefficient of skewness for the following distribution. [10]

Class	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	7	9	16	22	14	12	3

b) Weights in kg of 10 students are given below

38,40,45,53,47,43,55,48,52,49

Can we say that the variance of the normal distribution from which the above sample is drawn is 20 kg?

(Given: The value of χ^2 at 5% level of significance for 9 degree of freedom is 16.99) [10]

Q.5) a) What is the probability that 4 A's come consecutively in arrangements of the letters in the word 'MAHARASHTRA'? [5]

b) Consider an experiment "three coins are tossed". Let the random variable

$X = \text{'number of heads'}$ [5]

a) Find the values of X

b) Find the probability of X

c) Find the probability mass function d) Find the cumulative distribution function

c) Find the Spearman's rank correlation of the following data

[10]

Marks in D.M	64	50	44	42	56	65	59
Marks in C.O.A	80	60	37	51	30	75	44

Q.6)a) i) Find the probability of constructing two-digit even number using the digits 1,2,3,4,5,6,7,8,9.

if 1) Repetition of digits is allowed 2) Repetition of digits is not allowed.

[5]

b) Find the coefficient of variation for the following distribution.

[5]

Age in years	20-25	25-30	30-35	35-40	40-45	45-50
No of policyholders	2	7	5	2	4	5

c) Ram plays 12 game of chess with computer and he wins 6 games while computer wins 4 games and 2 games end in a tie. Ram again decides to play 3 games more.

Find the probability that-

i) Ram wins all three games.

ii) Two games end in a tie.

[5]

d) Calculate the model marks of the following

[5]

Marks	10-30	30-50	50-70	70-90	90-110	110-130
No. of students	4	10	14	12	8	6
