CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Software Engineering
Course Code	:	A405308
Branch	:	CSE/ CSM/ AIM
Date & Session	:	24-11-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1. List any two process models.   1 M
2. What is the purpose of CMMI?   1 M
3. List any two functional and non functional requirements.   1 M
4. What is the purpose of software requirement document?   1 M
5. List any two architecture styles.   1 M
6. How UML will be useful in software engineering?   1 M
7. Define Software Testing.   1 M
8. List any two debugging approaches.   1 M
9. What is the purpose of SSQA?   1 M
10. What do you mean by FTR?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Discuss in detail about the water fall model and explain how it has become the   10M
       fundamental basis for all remaining software models.

OR

11. B). Explain spiral model with a diagram.   10M

12. A). What is the purpose of Feasibility study? Discuss the different feasibility studies   10M
        available.

OR

12. B). Elaborate the process involved in requirements elicitation and analysis, requirement   10M
        validation & management.

13. A). Illustrate Architecture Styles and Patterns supported in Software Engineering.   10M

OR

13. B). What is the purpose of use case diagram? Explain its components with an example.   10M

14. A). Discuss the metrics that we need to consider for software quality.   10M

OR

14. B). Discuss the different techniques that are used in black box testing with examples   10M
        wherever required.

15. A). What is the need of SQA? Discuss the elements of SQA.   10M

OR

15. B). i) Write about ISO 9000 quality Standards.   5M
        ii) Write about reactive and proactive risk strategies.   5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Digital Electronics
Course Code	:	A404204
Branch	:	CSE/ CSC/ IT
Date & Session	:	26-11-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark. 10x1=10M

1. Express the following number in decimal $(16.6)_{16}$ 1 M
2. Find the 2's complement of 11011010. 1 M
3. Simplify $F(x,y,z)=\Sigma(2,3,4,5)$. 1 M
4. What are universal gates? 1 M
5. What is a Full Subtractor? 1 M
6. Draw the logic circuit diagram of a 4X1 Multiplexer. 1 M
7. Give the excitation table of a T flip flop. 1 M
8. What is clock skew? 1 M
9. Distinguish between PLA and PAL. 1 M
10. What is Hamming code? 1 M

PART-B
Answer the following. Each question carries TEN Marks. 5x10=50M

11.A). Convert the following decimal numbers to octal and hexadecimal: 10M
i) 239.45 ii) 437 iii) 5434.732

OR

11. B). Find the complements of the following expressions: 10M
i) $z+ z'(v'w +xy)$
ii) $(a+c)(a+b')(a'+b+c')$

12. A). Simplify the Boolean functions using K maps: 10M
i) $F(w,x,y,z)=\Sigma(1,4,5,6,12,14,15)$
ii) $F(w,x,y,z)=\Sigma(1,3,4,5,6,7,9,11,13,15)$

OR

12. B). Simplify the following expressions: 10M
i) $w'z + xz + x'y + w\,x'\,z$
ii) $AD' + B'C'D + BC\,D' + BC'D$

13. A). Using a decoder and external gates, design the combinational circuit defined by the 10M
following functions:
$F1= x'yz' + xz$; $F2= xy'z'+x'y$

(P.T.O..)

OR

13. B). Implement the following Boolean function with a multiplexer: 10M

$F(A,B,C,D)=\Sigma(0,2,5,8,10,14)$

14. A). Design a 4 bit synchronous up counter using D flip flop.   10M

OR

14. B). Draw the logic circuit diagram of a SR flip flop and explain its operation. Also give the   10M
truth table and excitation table of SR flip flop.

15. A). Given the 8 bit word 01011011. Generate the 13 bit composite word for the Hamming   10M
code that corrects single errors and detects double errors.

OR

15. B). Implement the following Boolean functions with a PLA: 10M

$F1(A,B,C)=\Sigma(1,3,5,6)$ $F2(A,B,C)=\Sigma(0,1,6,7)$

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CMR **CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Electronics Devices and Circuits
Course Code	:	A404203
Branch	:	CSE/ IT/ CSC/ CSM/ CSD/ AIM
Date & Session	:	28-11-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark. 10x1=10M

1. Define forward static and dynamic resistances of diode. 1 M
2. Differentiate Transition Capacitance and Diffusion Capacitance. 1 M
3. In a clamping circuit Rr =200kΩ, and Rf =300Ω, find resultant resistance value. 1 M
4. State Clamping Circuit Theorem. 1 M
5. Why is BJT a current controlled Transistor? 1 M
6. Show that $(1/\alpha) - (1/\beta) = 1$. 1 M
7. Define pinch off voltage? 1 M
8. List the classification of FETs. 1 M
9. List the applications of UJT. 1 M
10. Draw the symbols of Schottky Diode and Photo Diode. 1 M

PART-B
Answer the following. Each question carries TEN Marks. 5x10=50M

11.A).	Explain the operation of forward biased and reverse biased PN junction Diode.	10M
	OR	
11. B).	Explain in detail about the capacitance of the diode and derive the expression for diffusion capacitance of a diode.	10M
12. A).	Explain the working of a Full wave Bridge Rectifier and derive its average voltage, RMS voltage, Peak factor, Form factor, Form factor and Rectification efficiency.	10M
	OR	
12. B).	Explain half-wave rectifier and derive expressions for ripple factor and efficiency.	10M
13. A).	With necessary circuit and waveform, explain the switching characteristics of a transistor in detail.	10M
	OR	
13. B).	Draw and explain the input and output characteristics of the transistor in CE configuration.	10M
14. A).	Construct and explain the working of a P channel JFET and draw the VI characteristics of it.	10M
	OR	
14. B).	Discuss the construction and working of MOSFET in Enhancement mode.	10M
15. A).	Draw the SCR circuit diagram and explain its characteristics with waveforms.	10M
	OR	
15. B).	Construct and explain the operation of UJT and explain its characteristics with waveforms.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Object Oriented Programming Through Java
Course Code	:	CSE/ CSC/ CSD
Branch	:	A405303
Date & Session	:	01-12-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	State the difference between object based and object-oriented programming.	1 M
2.	Name two types of method binding supported in Java.	1 M
3.	What is the purpose of the super keyword in a subclass?	1 M
4.	Identify the main difference between a Class and an Interface in Java.	1 M
5.	Give the sequence of execution for try, catch, and finally blocks when an exception occurs.	1 M
6.	Which interface is primarily used to implement the thread behavior in Java?	1 M
7.	State one key limitation of AWT that Swing was designed to overcome.	1 M
8.	Name any four standard Layout Managers available in AWT.	1 M
9.	What is the primary purpose of an Adapter Class in event handling?	1 M
10.	Write one use of JDBC.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	i) Define Method Overloading and write a simple Java code snippet illustrating it.	5M
	ii) List and briefly explain the four main Abstraction Mechanisms in OOP.	5M

OR

11. B).	i) Write a Java program to calculate the factorial of a number using a recursive method.	5M
	ii) Describe the process of Garbage Collection in Java and when the finalize() method is called.	5M

12. A).	State the three forms of Inheritance (specialization, specification and construction) and provide one example program for each.	10M

OR

12. B).	i) Design a Java package named myutils that contains an interface for calculating area and implement it in a separate class outside the package.	6M
	ii) Explain the role of the final keyword when applied to a class, a method, and a variable, providing an example for each case.	4M

13. A).	i) Write a Java program that demonstrates the use of try, catch, finally, and throws for handling a division-by-zero scenario.	5M
	ii) List the benefits of Exception Handling and briefly explain the difference between the Termination and Resumptive models.	5M

(P.T.O..)

13. B).   i) Write a program to create two threads, one printing odd numbers and the other printing even numbers, ensuring thread synchronization to print them sequentially.   6M

ii) Briefly explain the concepts of Autoboxing and Generics in Java, providing one example for each.   4M

14. A).   i) Differentiate between AWT and Swing based on architecture and lightweight or heavyweight nature.   5M

ii) Write the necessary Java code to create a simple JFrame with two JButton components, using a FlowLayout manager.   5M

14. B).   i) Illustrate the Model-View-Controller (MVC) architecture as applied to Swing components.   4M

ii) Briefly describe the use of the CardLayout and GridBagLayout managers with an example program.   6M

15. A).   i) Outline the different states in the life cycle of an Applet and the methods associated with each state.   6M

ii) Define a Lambda Function in the context of JAVA 8 and provide a simple code example using a functional interface.   4M

15. B).   i) Write a program using the Delegation Event Model to handle a button click event (implementing ActionListener).   4M

ii) What are the methods supported by keyListener and mouse interface? Write a java program to handle mouse events.   6M

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CMR **CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Database Management Systems
Course Code	:	A405304
Branch	:	CSE/ CSC/ CSD
Date & Session	:	03-12-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. 10x1=10M

1.	Define Data independence.	1 M
2.	Define Entity – Relationship Model.	1 M
3.	Define relational database schema.	1 M
4.	List out the operations of the relational algebra.	1 M
5.	What is basic form of SQL Query?	1 M
6.	Define BCNF.	1 M
7.	List the properties of transaction.	1 M
8.	What is durability of transaction?	1 M
9.	What are the properties of B+ tree index file?	1 M
10.	Define Primary index.	1 M

PART-B

Answer the following. Each question carries TEN Marks. 5x10=50M

11.A). Explain the architecture of database system with a neat diagram. 10M

OR

11. B). Construct the ER diagram for a company needs to store information about employees 10M
(Identified by ssn, with salary and phone as attributes), departments (Identified by dno, with dname and budget as attributes), and children of employees (With name and age as attributes). Employees work in departments, each department is managed by an employee, a child must be identified uniquely by name when the parent
(Who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.

12. A). i) Make a comparison between the tuple relational calculus and domain relational 5M
calculus.

ii) Explain about integrity constraints over relations. 5M

OR

12. B). Consider the following schema: 10M
Suppliers(*sid:* integer, *sname:* string, *address:* string)
Parts(*pid:* integer, *pname:* string, *color:* string)
Catalog(*sid:* integer, *pid:* integer, *cost:* real)

Write the following queries in relational algebra.
i) Find the *name*s of suppliers who supply some red part.
ii) Find the *sid*s of suppliers who supply some red or green part.
iii) Find the *sid*s of suppliers who supply some red part or are at 221 Packer Ave.
iv) Find the *sid*s of suppliers who supply some red part and some green part.

(P.T.O..)

13. A). i) Explain Set Operators in SQL with an example.   5M
       ii) Explain Aggregate functions in SQL with examples.   5M

                                              OR

13. B). Consider a relation R with four attributes ABCD and Functional Dependency set is   10M
       {A→B, C→D}:

       (i) Find the candidate key(s) for R. (ii) find the best normal form that R satisfies (iii) If R
       is not in BCNF, decompose it into a set of BCNF relations.

14. A). Explain the conflict serializability and view serializability with an example.   10M

                                              OR

14. B). Explain about two-phase locking and timestamp-based protocols with its transactions and   10M
       schedules.

15. A). Create B tree and B+ tree to insert the following key values (the order of the tree is three)   10M
       32, 11, 15, 13, 7, 22, 15, 44, 67, 4.

                                              OR

15. B). i) Explain about cluster index, primary and secondary indexes with examples.   5M
       ii) Explain the differences between tree based and Hash based indexes.   5N

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Computer Oriented Statistical Methods
Course Code	:	A400006
Branch	:	IT/ CSD
Date & Session	:	24-11-2025 FN

Duration: 3 hours   Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1. Define equally likely events with an example.   1 M
2. Prove that $P(A \cap \bar{B}) = P(A) - P(A \cap B)$.   1 M
3. If X is a Poisson variant, such that $P(X = 0) = P(X = 2) + 3 P(X = 4)$. Find the mean.   1 M
4. The mean and variance of a binomial distribution are 6 and 3 respectively. Find p,q.   1 M
5. What is the degrees of freedom of F- distribution?   1 M
6. Write any two properties of t- distribution.   1 M
7. Define null hypothesis.   1 M
8. Write the test statistic for single mean.   1 M
9. Define a transition probability matrix.   1 M
10. Define an ergodic chain.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) Two aeroplanes bomb a target in succession. The probability of each correctly scoring a hit is 0.3 and 0.2 respectively. The second will bomb only if the first misses the target. Find the probability that target is hit.   5M

ii) A product is assembled from 3 components X, Y, Z. the probability of these components being defective is 0.01, 0.02, 0.05 respectively. What is the probability that the assembled product will not be defective?   5M

OR

11. B). In a factory, machine A produces 40% of the total output and machine B produces 60%. On the average 9 items in 1000 produced by A are defective and 1 item in 250 produced by B is defective. An item is drawn at random from a day's output is defective, what is the probability that it was produced by A?   10M

12. A). If a poisson distribution is such that $P(X=1).(3/2) = P(X=3)$, find   10M
i) $P(X \geq 1)$ ii) $P(X \leq 3)$ iii) $P(2 \leq X \leq 5)$.

OR

12. B). (i) A random variable 'X' has the following probability function   10M

X	0	1	2	3	4	5	6
P(X)	K	3k	5k	7k	9k	11k	13k

i) Find the value of 'k'
ii) Mean
iii) Variance.
iv) Evaluate $P(X< 4)$, $P(X \geq 5)$.

(P.T.O..)

13. A). In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.   10M

<div align="center">**OR**</div>

13. B). i) Find mean and variance of Uniform distribution.   5M

ii) Write the properties of F- distribution.   5M

14. A). i) Write the properties of good estimator.   5M

ii) Among 900 people in a state 90 are found to be chapati eaters. Construct 99% confidence interval for the true proportion.   5M

<div align="center">**OR**</div>

14. B). i) A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group 150 students having mean IQ of 75 with a s.d of 15, in the second group there are 250 students having mean IQ of 70 with a s.d of 20. Is there a significant difference between the means of two groups?   7M

ii) A die was thrown 9000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased?   3M

15. A). Given the transition probability matrix   10M

$$\begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$$

(i) Compute the two-step transition matrix $P^{(2)}$
(ii) Find the steady-state probability vector π.

<div align="center">**OR**</div>

15. B). Define a Markov process. Explain the concepts of transition probability and the Markov property with a suitable example.   10M

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CMR **CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
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Examination	:	B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name	:	**Discrete Mathematics**
Course Code	:	A405306
Branch	:	CSC
Date & Session	:	24-11-2025 FN

Duration: 3 hours   Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1. Write the converse of the statement: If there is a flood then the crop will be destroyed.   1 M

2. Using the statements R: Mark is rich H: Mark is happy
   Denote the following statement in symbolic form.Mark is poor but happy.   1 M

3. Give an example of partial order relation.   1 M

4. Let f: R → R be given by $f(x) = x^3 - 2$, Find f^{-1}?   1 M

5. Define lattice.   1 M

6. Define semi group.   1 M

7. State the multinomial theorem.   1 M

8. How many different licence plates can be printed containing two letters followed by three digits?   1 M

9. Draw the cycle graph of order 5.   1 M

10. Find the chromatic number of a complete graph of five vertices.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) Use truth table to verify the following logical equivalence   5M
$p \to (q \wedge r) \Leftrightarrow (p \to q) \wedge (p \to r)$
ii) Show that $S \vee R$ is automatically implied by $(P \vee Q) \wedge (P \to R) \wedge (Q \to S)$ 5M

OR

11. B). i) Indentify that $[(p \to (q \to r)) \to ((p \to q) \to (p \to r))]$ is a tautology.   5M
ii) Show that $R \vee S$ follows logically from the premises   5M
$C \vee D, C \vee D \to \neg H, \neg H \to (A \wedge \neg B)$ and $(A \wedge \neg B) \to R \vee S$

12. A). i) Let X = {1, 2, 3, 4, 5, 6, 7} and R= {(x, y)/ x-y is divisible by 3} in X. show that R is an equivalence relation.   5M
ii) Let f: R → R be given by $f(x) = x^3 - 2$, Find f^{-1} and fof^{-1}.   5M

OR

12. B). i) Given S = {1,2,...,10} and relation R on S where R {(x,y)|x + y = 10} What are the properties of the relation R.   5M
ii) Let X = {1,2,3,4} and a mapping f: X→X be given by   5M
$f = \{(1,2),(2,3),(3,4), (4,1)\}$. Find the composite functions f^2, f^3.

(P.T.O..)

13. A). i) A binary operation * is defined on set of integers Z by, $a*b = a+b-ab$ for all a and b 5M
in Z. Show that (Z, *) is a semi group.

ii) Explain about the algebraic structure with an example.   5M

OR

13. B). i) Define Monoid and give an example.   5M

ii) Show that (S,/) is a latitce where S=$\{1,2,3,6,9,18\}$ 5M

14. A). i) Find the number of permutation that can be formed from all the letters of each word   5M
a) QUEUE   b) PROPOSITION.

ii) Find the number of non negative solutions to x+y+z=20 with the condition that   5M
$x \geq 5, y \geq 3, z \geq 1$

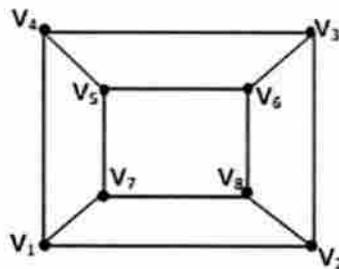OR

14. B). i) A store sells 4 kinds of cookies. Find the number of ways a customer can buy   5M
a) 10 cookies   b) 15 cookies.

ii) Find the 7th term of the expansion $(2x-3y)^{10}$ 5M

15. A). Compare whether the following graphs are Isomorphic or not?   10M
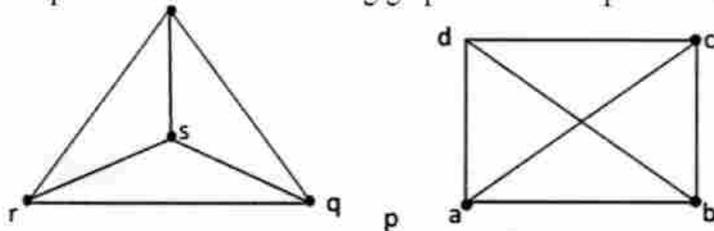
OR

15. B). Find the Hamilton circuit and Euler circuit for the following graph. If it exists.   10M

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H.T No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] **R22**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Computer Organization and Architecture
Course Code	:	A405307
Branch	:	CSM/ CSD/ AIM
Date & Session	:	26-11-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1. List the main components of a digital computer.   1 M
2. Define Register Transfer Language.   1 M
3. What is control memory?   1 M
4. Define program control.   1 M
5. Define data representation.   1 M
6. When overflow occurs in addition/subtraction?   1 M
7. Why is asynchronous transfer used in computer systems?   1 M
8. What is auxiliary memory?   1 M
9. List any two characteristics of CISC architecture.   1 M
10. What is a multiprocessor system?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Discuss the differences between Computer Architecture and Organization with suitable diagrams.   10M

OR

11. B). Elaborate different types of micro-operations with examples.   10M

12. A). Explain address sequencing in microprogrammed control. Discuss various techniques for sequencing.   10M

OR

12. B). Design an instruction format for a hypothetical 16-bit processor supporting four addressing modes.   10M

13. A). Discuss fixed point representation with suitable examples. What are its advantages and disadvantages?   10M

OR

13. B). Explain Booth's multiplication algorithm in detail with step-by-step computation for given - 9x-13 binary numbers.   10M

14. A). Explain the structure and function of an Input–Output Interface with a neat diagram.   10M

OR

14. B). Analyze various design parameters influencing memory hierarchy in modern CPUs.   10M

15. A). Explain about four segment instruction pipeline with neat flow chart.   10M

OR

15. B). Discuss the role of inter processor arbitration and its importance in multiprocessor design.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Mathematical and Statistical Foundations
Course Code	:	A400003
Branch	:	CSM/ AIM
Date & Session	:	01-12-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	Find GCD (48, 18)	1 M
2.	Find LCM of(2420,230)	1 M
3.	Write the normal equations to fit a straight line.	1 M
4.	Define probability mass function.	1 M
5.	Define the standard normal random variable.	1 M
6.	Find $F_{0.95}(10,20)$.	1 M
7.	Define interval estimation.	1 M
8.	Define the null hypothesis and the alternative hypothesis.	1 M
9.	Define a stochastic process.	1 M
10.	Define the transition probability matrix.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Find GCD (56, 72) and write their Linear combination.	10M
	OR	
11. B).	Solve the linear congruence $25x \equiv 15(mod\ 29)$	10M
12. A).	The following regression equations were obtained from a correlation table $Y = 0.516X + 33.73$ and $X = 0.512Y + 32.52$. Find $\rho, \bar{x}$ and $\bar{y}$	10M
	OR	
12. B).	The average number of phone calls/minute coming into a switch board between 2 PM and 4 PM is 2.5. Determine the probability that during one particular minute there will be (i) At most 4 calls (ii) At least 6 calls.	10M
13. A).	The memory chips made in a certain plant with mean defective of 10 and standard deviation of 3 then find the probabilities that in a lot for inspection (i) At most 15 will be defective (ii) Exactly 15 will be defective (iii) Between 5 and 12 are defective.	10M
	OR	
13. B).	If a $1-$gallon can of paint covers on the average 513.3 square feet with a standard deviation of 31.5 square feet, what is the probability that the sample mean area covered by a sample of 40 of these $1-$gallon cans will be anywhere from 510.0 to 520.0 square feet.	10M

(P.T.O..)

14. A). A trucking firm is suspicious of the claim that the average lifetime of certain tires is at least 28,000miles. To check the claim, the firm puts 40of these tires on its trucks and gets a mean lifetime of 27,463miles with a standard deviation of 1,348miles. What can it conclude if the probability of a type I error is to be at most0.01.   10M

<div align="center">OR</div>

14. B). It is desired to determine whether there is less variability in the silver plating done by company 1 than in that done by company 2. If independent random samples of size 12 of the two companies work yield $s_1 = 0.035$mil and $s_2 = 0.062$mil, test the null hypothesis $\sigma_1^2 = \sigma_2^2$ against the alternative hypothesis $\sigma_1^2 < \sigma_2^2$ at the 0.05 level of significance.   10M

15. A). A college student has the following study habits. If he studies one night, then 70%sure not to study in the next night. If he does not study one night, then he is only 60%sure not to study next night also. (i) Find the transition probability matrix (ii) How often he studies in the long run.   10M

<div align="center">OR</div>

15. B). The transition probability matrix of Markov chain {Xn} having states 1,2,3 is   10M

$$P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$$ with initial distribution $p^{(0)} = [0.7, 0.2, 0.1]$

Then find (i) $P\{X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2\}$
(ii) $P\{X_3 = 3, X_2 = 2, X_1 = 1, X_0 = 1\}$
(iii)) $P\{X_2 = 3\}$

<div align="center">*****</div>

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Operating Systems
Course Code	:	A405305
Branch	:	CSM/ AIM
Date & Session	:	03-12-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	What is a system call?	1 M
2.	Differentiate between user mode and kernel mode.	1 M
3.	Which scheduling algorithm provides the best average turnaround time?	1 M
4.	What is the difference between preemptive and non-preemptive scheduling?	1 M
5.	What is a semaphore?	1 M
6.	Evaluate the advantages of using message queues over pipes.	1 M
7.	How does demand paging improve memory utilization?	1 M
8.	Which page replacement algorithm performs best in most cases?	1 M
9.	What is a directory?	1 M
10.	Which file allocation method minimizes external fragmentation?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain Process concept. Explain various states of a process with the help of a transition diagram.   10M

OR

11. B). Explain about operating system structures with neat diagrams.   10M

12. A). Consider the following set of processes   p1, p2, p3, p4 with their arrival and burst times   10M
given in below table:

PROCESS	ARRIVAL TIME	BURST TIME
P1	0	9
P2	1	7
P3	2	2
P4	3	6

i) Draw the Gantt chart and calculate the average waiting time and average turnaround time using SJF (Preemptive and non-Preemptive) algorithm.
ii) Draw the Gantt chart and calculate the average waiting time and average turnaround time using Round robin algorithm (TQ=2ms).

OR

12. B). What is a Resource Allocation Graph (RAG)? Explain how RAG is very useful? Explain   10M
Banker's Algorithm in detail.

(P.T.O..)

13. A). Define the Critical section problem. What are the requirements that a solution to the critical section problem must satisfy? And also Explain synchronization hardware solutions.   10M

OR

13. B). Discuss various types of Inter-process Communication mechanisms.   10M

14. A). Consider the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. Trace FIFO, optimal, and LRU page replacement algorithms.   10M

OR

14. B). Explain in detail about segmentation and paging in operating system with suitable diagram.   10M

15. A). Explain various file access methods with suitable examples.   10M

OR

15. B). Discuss in detail about free space management with a neat sketch.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Basic Electrical and Electronics Engineering
Course Code	:	A402204
Branch	:	CE/ ME
Date & Session	:	03-12-2025 FN

Duration: 3 hours   Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	State Ohm's law and write its limitations.	1 M
2.	Define active, reactive, and apparent power in AC circuits.	1 M
3.	Define power factor and its importance.	1 M
4.	List the types of earthing.	1 M
5.	State the principle of operation of a DC generator.	1 M
6.	What are the applications of DC motors in civil engineering?	1 M
7.	Write differences between ideal and practical diodes.	1 M
8.	Why zener diode acts as a voltage regulator?	1 M
9.	How many types of transistors are there? List them.	1 M
10.	Write the differences between BJT and FET.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Analyze KVL and KCL with suitable examples.	10M
	OR	
11. B).	Derive the relationship between voltage and current in star and delta-connected circuits.	10M
12. A).	Classify the various types of batteries based on their characteristics.	10M
	OR	
12. B).	Explain the working of the Switch fuse unit, MCB and ELCB with neat sketches.	10M
13. A).	Explain the different losses that occur in a single-phase transformer and also derive the maximum efficiency condition for the same.	10M
	OR	
13. B).	Explain the construction and working principle of a synchronous generator with neat sketches.	10M
14. A).	Illustrate VI-characteristics of a PN Junction diode.	10M
	OR	
14. B).	Explain the different types of filters used in rectifiers.	10M
15. A).	Compare CB, CE and CC configurations of a transistor.	10M
	OR	
15. B).	Explain the construction and working principle of a FET.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Numerical Methods and Complex Variables
Course Code	:	A400007
Branch	:	EEE & ECE
Date & Session	:	24-11-2025 FN

Duration: 3 hours   Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	Define Bisection method.	1 M
2.	Write the relation between ∇ and E.	1 M
3.	If $\frac{dy}{dx} = \frac{y-2x}{y}$, y (0) =1 and h = 0.1, then find y (0.1) by Euler's method.	1 M
4.	If $\frac{dy}{dx} = x^2 + y^2, y(0) = 0$, then find $y_1(x)$ by Picard's method.	1 M
5.	State Cauchy – Riemann equations in Cartesian coordinates.	1 M
6.	Show that z^2 is analytic for all z.	1 M
7.	State Cauchy's Integral Theorem.	1 M
8.	Find the poles of the function $f(z) = \frac{1}{(z+1)(z+3)}$ and calculate residue at $z = 3$.	1 M
9.	If $f(x) = |cosx|$ in $(-\pi, \pi)$, then find the Fourier coefficient a_0.	1 M
10.	Write Dirichlet's conditions.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	By using bisection method, find an approximate root of the equation $Sinx = \frac{1}{x}$, that lies between x = 1 and x = 1.5 (measured in radians). Carry out upto 8th stage.	10M

OR

11. B). From the following table, estimate the number of students who obtained marks between 40 and 45:   10M

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

12. A). Evaluate $\int_0^1 \frac{dx}{1+x^2} dx$ using   10M

   (i) Trapezoidal rule
   (ii) Simpson's 1/3rd rule
   (iii) Simpson's $3/8^{th}$ rule.

OR

12. B). Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with $y(0) = 1$ at $x = 0.2 \ and \ 0.4$.   10M

(P.T.O..)

13. A). Prove that the function f(z) defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ $(z \neq 0), f(0) = 0$ is   10M
continuous and the Cauchy – Riemann equations are satisfied at the origin at the origin,
yet $y'(0)$ does not exist.

OR

13. B). (i) If f(z) is an analytic function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \log|f(z)| = 0$.   5M

   5M

(ii) Find the bilinear transformation which maps 1, i, -1 to 2, i, -2 respectively. Find the
fixed critical points of the transformation.

14. A). (i) Evaluate $\int_C \frac{e^{2z}}{(z+1)^4}\,dz$, where C is the circle $|z| = 2$.   5M

   5M

(ii) Evaluate $\int_C tanz\,dz$, where C is the circle $|z| = 2$ by Residue theorem.

OR

14. B). Find the Laurent's expansion of $f(z) = \frac{7z-2}{(z+1)\,z\,(z-2)}$ in the region $1 < z + 1 < 3$.   10M

15. A). Obtain the Fourier series of the function $(x) = \begin{cases} 0, -\pi \leq x \leq 0 \\ x^2, 0 \leq x \leq \pi \end{cases}$.   10M

OR

15. B). (i) Find the Fourier transform of $e^{-a^2x^2}, a > 0$. Hence deduce that $e^{-\frac{x^2}{2}}$ is self reciprocal   5M
in respect of Fourier transform.

(ii) Find the Fourier sine and cosine transform of $x^{n-1}, n > 0$.   5M

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