

Register No.: ..... Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FIRST SEMESTER B.TECH DEGREE EXAMINATION (S,FE), NOVEMBER 2024****Course Code:** 20EST120**Course Name:** Basics of Civil and Mechanical Engineering**Max. Marks:** 100**Duration:** 3 Hours**PART I BASIC CIVIL ENGINEERING***Part I to be answered in pages 1 to 15***PART A***(Answer all questions. Each question carries 4 marks)*

1. List the major disciplines of Civil Engineering along with their role in the infrastructural development.
2. What is efflorescence. Explain the test to find out efflorescence.
3. Define surveying and list its objectives.
4. Discuss the Civil Engineering aspect of elevators and escalators.
5. What is a green building? Highlight its features.

**PART B***(Answer one full question from each module, each question carries 10 marks)***MODULE I**

- |   | <b>Marks</b> |
|---|--------------|
| 6. a) Explain the relevance of Civil Engineering in the overall infrastructural development of the country. | (4)          |
| b) Sketch the components of a building along with their functions.  | (6)          |

**OR**

- |   | <b>Marks</b> |
|---|--------------|
| 7. a) Classify the following buildings as per NBC classification based on occupancy: (i) College (ii) Prison (iii) Shopping Mall (iv) Library. Justify your answer. | (4)          |
| b) Define floor area, carpet area and floor area ratio for a building as per KBR.   | (6)          |

**MODULE II**

- |   | <b>Marks</b> |
|---|--------------|
| 8. a) Demonstrate the principles of surveying with necessary figures. | (5)          |
| b) Sketch any five market forms of steel along with its uses.         | (5)          |

**OR**

- |   | <b>Marks</b> |
|---|--------------|
| 9. a) List the characteristics and uses of timber   | (6)          |
| b) Identify the modern construction materials that you would prefer in (i) the internal walls of theatres (ii) to maintain acceptable temperature in buildings. Explain with an example for each. | (4)          |

**MODULE III**

- |   | <b>Marks</b> |
|---|--------------|
| 10. a) Compare header and stretcher bonds along with neat labelled sketch of its elevation. | (4)          |
| b) Elaborate on the materials and energy systems in Green Buildings                         | (6)          |

**OR**

- |  | <b>Marks</b> |
|--|--------------|
| 11. a) Sketch a caisson and grillage foundation and classify them into deep or shallow foundation. Also mention an application for each. | (5)          |
| b) Explain fire safety in buildings.   | (5)          |

**PART II BASIC MECHANICAL ENGINEERING**

*Part II to be answered in pages 16 to 30*

**PART C**

*(Answer all questions. Each question carries 4 marks)*

12. Sketch the P-V diagram of a Diesel cycle. List the processes and write down the air standard efficiency in terms of compression ratio and cut-off ratio.
13. Explain the working of a reciprocating pump with a neat figure.
14. With the help of a neat sketch, explain the working principle of single plate clutches.
15. Explain the desirable properties of moulding sand used in sand casting.
16. With the help of a block diagram, explain the components and working of a CNC machine.

## PART D

(Answer one full question from each module, each question carries 10 marks)

## MODULE IV

Marks

17. In a constant volume Otto cycle, the pressure at the end of compression is 15 times that at the start, the temperature of air at the beginning of compression is 38 °C and maximum temperature attained in the cycle is 1950 °C. Represent the points on a P-V diagram. Determine (i.) compression ratio (ii.) thermal efficiency of the cycle (iii.) work done per kg of air. Take  $\gamma = 1.4$  and  $C_v = 0.718 \text{ kJ/kgK}$  for air.

(10)

OR

Marks

18. a) With the help of necessary schematic diagrams and P-V plot, explain the working of a 2-stroke petrol engine.  
b) Explain the MPFI system with block diagram.

(7)

(3)

## MODULE V

Marks

19. a) Explain the terms:  
(i) Refrigerating Effect, (ii) Standard Rating of a Refrigerating Machine  
b) With the help of neat sketch, explain central air conditioners.

(4)

(6)

OR

Marks

20. a) Identify and write down the major five differences between impulse and reaction turbines with examples.  
b) Compare chain drive and belt drive systems

(5)

(5)

## MODULE VI

Marks

21. a) List the various types of welding processes.  
b) Explain the methods of extrusion with neat sketches.

(4)

(6)

OR

Marks

22. a) Explain the basic working principle of a lathe with a neat sketch.  
b) With necessary diagrams, explain the operations performed on a drilling machine.

(6)

(4)

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