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R22



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Additive Manufacturing
Course Code : A403405
Branch : Mechanical Engineering
Date & Session : 24-11-2025 AN **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 advantages of Rapid prototyping. 1 M
2. Write about Rapid prototyping process chain. 1 M
3. State the advantages of SLA process. 1 M
4. Briefly write the prominence of Laminated object manufacturing. 1 M
5. What is indirect Rapid Tooling? 1 M
6. Write the limitations of Fused deposition modeling (FDM). 1 M
7. List the features of STL file format. 1 M
8. Name various RP softwares. 1 M
9. Explain the application of RP in jewelry industry. 1 M
10. Mention RP applications in automotive industry. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Describe historical development of Rapid prototyping and write the classification of RP process. 10M

OR

11. B). (i) What is rapid prototyping? Give its advantages and limitations. 5M
(ii) Compare and explain the differences between conventional machining and rapid prototyping. 5M

12. A). Describe the working principle, advantages and disadvantages of SGC process with a neat diagram. 10M

OR

12. B). Discuss in detail about the working principle of Laminated Object Manufacturing (LOM). Also state advantages and disadvantages of LOM. 10M

13. A). Explain the working principle of the Selective Laser Sintering (SLS) process with a neat, labeled schematic diagram. 10M

OR

13. B). (i) Illustrate the differences between conventional tooling and rapid tooling. 5M
(ii) Explain about EOS direct tool process. 5M

(P.T.O.)

14. A). (i) Explain about magics and mimics softwares. 5M
(ii) Explain about STL file problems in detail with examples. 5M

OR

14. B). Write short notes on following: 10M
(i) part building errors
(ii) Errors in STL files
(iii) Features of Mimics software

15. A). Briefly describe typical RP applications in engineering, analysis and aerospace industry and illustrate them with examples. 10M

OR

15. B). (i) Explain the application of RP technology in Art, Archeology and architecture. 5M
(ii) Elaborate applications of GIS. 5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Industrial Management
Course Code : A403318
Branch : Mechanical Engineering
Date & Session : 26-11-2025 AN **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 are Maslow's Hierarchy of needs? 1 M
2. List out the main components in theory of scientific management. 1 M
3. State the different types of organization structures. 1 M
4. When is matrix structure appropriate to organizations? 1 M
5. Give the list of different plant layouts? 1 M
6. What do you mean by Value and Cost? 1 M
7. Define Work Measurement. 1 M
8. Name the various types of control charts. 1 M
9. What are the benefits of job evaluation? 1 M
10. Expansion form of PERT and write the applications of PERT. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Discuss the contributions of F.W.Taylor to the theory of management. Explain why is he regarded as the father of scientific management. 10M

OR

11. B). State and describe the various leadership styles in management. 10M

12. A). What do you understand by organization theory? What is its role in providing insights for designing organization structure? 10M

OR

12. B). How does line and staff organization structure differ from pure line organization structure? What are the benefits and limitations of line and staff organization structure? 10M

13. A). (i) Explain the concept of line balancing and its importance in production systems. 5M
(ii) Describe the steps involved in the RPW method for line balancing. 5M

OR

13. B). Explain the features, advantages, limitations and suitability of following layouts: 10M
(i) Product Layout (ii) Process layout (iii) Fixed position layout

14. A). Define the term 'time study' and explain its objectives. 10M

OR

14. B). (i) Differentiate between variable charts and attribute charts. 5M
(ii) Explain working principle of double sampling plan with a flow chart. 5M

(P.T.O.)

15. A). Describe factor comparison method of job evaluation with its merits and demerits. 10M

OR

15. B). A firm is considering the launch of a new product in the national market. The project consists of the ten major activities. The precedence relationship and the estimated duration of each of the activity is given in the table below. 10M

Activity	Predecessor	Duration (weeks)
A	-	8
B	-	3
C	A	6
D	B	4
E	B	5
F	A	4
G	B	6
H	C,D,E	6
I	F,G,H	6

i) Draw a network of the above project.

ii) What is the total duration of the project?

iii) Identify the critical path? Do you have any specific observation to make?

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Non-Conventional Energy Sources
Course Code : A403411
Branch : Mechanical Engineering
Date & Session : 28-11-2025 AN 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 the term 'Solar Constant' and specify its units. 1 M
2. Define the term 'Extraterrestrial' radiation. 1 M
3. Outline the use of Concentrating Collector. 1 M
4. Define 'Seebeck effect' and give its application. 1 M
5. Recall the purpose of a 'Solar pond'. 1 M
6. Outline the utility of Solar Distillation process. 1 M
7. List the main applications of wind energy. 1 M
8. What are the main components of a wind energy conversion system? 1 M
9. What are the main sources of biomass? 1 M
10. List the main components of a biogas plant. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Explain the different components of solar radiation reaching the earth's surface. 5M
ii) Discuss the factors affecting solar radiation on the earth's surface. 5M

OR

11. B). Derive the expression for the angle of incidence of solar radiation on a tilted surface. 10M

12. A). i) Explain the principle and working of an Electron Gas Dynamic Conversion system with a neat diagram. 5M
ii) Compare Electron Gas Dynamic Conversion with Magneto-Hydrodynamic (MHD) power generation. 5M

OR

12. B). i) Explain the principle of Magneto Hydro Dynamic (MHD) power generation. 5M
ii) Discuss the advantages and disadvantages of MHD power generation. 5M

13. A). i) Explain in detail the different methods of solar energy storage. 6M
ii) Discuss the advantages, disadvantages, and applications of tidal energy. 4M

OR

13. B). Explain the principle and working of an Ocean Thermal Energy Conversion (OTEC) system. 10M

(P.T.O.)

14. A). Discuss the environmental impacts of wind energy projects and how they can be minimized. 10M

OR

14. B). Compare the working of a horizontal axis wind mill with vertical axis wind mill with neat, labeled diagrams. 10M

15. A). i) Discuss the applications and limitations of biomass energy in India. 4M

ii) Explain in detail the various methods of converting biomass into useful energy. 6M

OR

15. B). Explain in detail the process of anaerobic digestion. Discuss its stages and factors affecting gas production. 10M



CMR COLLEGE OF ENGINEERING & TECHNOLOGY (UGC AUTONOMOUS)

Examination	: B.Tech VII Semester Regular Examinations Nov/Dec-2025	
Course Name	: Turbo Machinery	
Course Code	: A403414	
Branch	: Mechanical Engineering	
Date & Session	: 01-12-2025 AN	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. Distinguish between static and stagnation pressure. 1 M
2. What does the term 'reheat factor' refer to in turbo machines? 1 M
3. Define a Specific speed. 1 M
4. Define net positive suction head. 1 M
5. What is slip factor? 1 M
6. Define Mach Number. 1 M
7. Define stage efficiency in axial compressors 1 M
8. Name any two losses occurring in axial flow compressors. 1 M
9. How is the degree of reaction of an axial turbine stage defined? 1 M
10. Mention the methods of cooling turbine blades. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

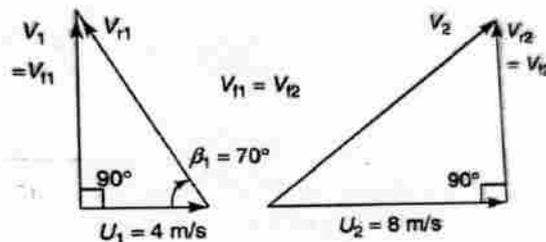
5x10=50M

- 11.A). i) Define turbomachine. Explain the salient features of a turbomachines. 5M
 ii) Derive an expression for polytropic efficiency for expansion processes. 5M

OR

11. B). i) Distinguish between turbo machines with positive displacement machines. 5M
 ii) Derive the expression for the reheat factor in terms of stage pressure ratio and stage efficiency. 5M

12. A). The velocity triangle at the inlet and outlet is as shown in figure. 10M



State the reasons the following :

- (i) Whether the machine is radial flow type or axial flow type
 - (ii) Whether the machine is work producing type or work absorbing type
- Calculate : (i) Specific work (ii) Degree of reaction.

(P.T.O.)

OR

12. B). i) Define the Cavitation and what are its effects. 5M
ii) A centrifugal pump is to discharge $0.118 \text{ m}^3/\text{s}$ at a speed of 1450 r.p.m, against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and Manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. 5M
13. A). i) What is Mach number? Explain its importance and applications in gas dynamics of compressors and turbines. 5M
ii) Air enters a nozzle at 400 kPa and 500 K with negligible velocity. If the exit pressure is 150 kPa and the flow is isentropic, calculate the exit velocity and temperature. 5M

OR

13. B). i) Explain the phenomenon of slip in centrifugal compressor. 5M
ii) A centrifugal compressor delivers 16.5 kg/s of air with a total head pressure ratio of 4:1. The speed of the compressor is 15000 r.p.m. Inlet total head temperature is 20°C , slip factor 0.9, power input factor 1.0 and 80% isentropic efficiency. Calculate: (a) Overall diameter of the impeller (b) Power Input. 5M
14. A). An axial flow compressor compresses the air from an inlet condition of 1 bar and 290 K to a delivery pressure of 5 bar with an overall isentropic efficiency of 87%. The degree of reaction is 0.5 and the blade angles at inlet and outlet are 44° and 13° respectively. The mean blade speed and axial velocity are constant throughout the compressor. Assuming a blade velocity of 180 m/sec, and work done factor 0.85, calculate the number of stages. 10M

OR

14. B). i) Explain the working of an axial flow compressor with a neat sketch. 5M
ii) The following data relate to an axial flow compressor: 5M
Blade velocity : 240 m/s
Flow velocity : 190 m/s
Inlet and exit angles of the air : 45° and 14° respectively
Calculate: (i) the pressure rise (ii) the work done per kg of air.
15. A). i) What is Zweifel's relation? How does it help in blade cascade design for axial turbines? 5M
ii) For a given axial turbine stage, the blade speed at the mean radius is 250 m/s, the absolute velocity of steam at inlet is 300 m/s at an angle of 20° to the axial direction. Calculate the work done per kg and draw the velocity triangle for the stage. 5M

OR

15. B). i) Outline the process of blade assembly and material selection for axial flow turbines. 5M
ii) Explain briefly the performance characteristics of axial turbines. 5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Composite Materials
Course Code : A403418
Branch : Mechanical Engineering
Date & Session : 03-12-2025 AN **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 any one difference between a lamina and a laminate. 1 M
2. Enlist two significant functional properties of any one reinforcement material. 1 M
3. Give two advantages of the glass fiber. 1 M
4. What are the significances of maintaining optimum interfacial bond strength? 1 M
5. List out the manufacturing methods of polymer matrix composites. 1 M
6. What are the advantages of ceramic matrix composites? 1 M
7. Mention the types of matrices used in metal matrix composites. 1 M
8. State the applications of carbon fiber composites especially in space. 1 M
9. Specify the Halphin–Tsai equation for the in-plane shear modulus, G_{12} . 1 M
10. With usual notations, provide expression of the linear coefficient of thermal expansion in direction 1, for a typical unidirectional lamina. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Summarize the advantages of composite materials. Also brief about the typical applications of polymer matrix composites. 10M

OR

11. B). Discuss in detail the classification of composites based on type of matrix. 10M

12. A). Briefly explain the following reinforcement materials used in polymer based composites. 10M
i) Carbon, ii) Glass and iii) Aramid.

OR

12. B). Elaborate with neat sketch of the specimen, the Iosipescu test used in the analysis of interfacial shear strength in composites. 10M

13. A). Explain typical applications of polymer matrix composites. 10M

OR

13. B). Illustrate the supporting schematic diagram and hence describe the fabrication of ceramic matrix composites. 10M

14. A). What are metal matrix composites? Elaborate on their advantages. 10M

OR

14. B). Discuss the discontinuously reinforced metal matrix composites. Also, summarize their properties. 10M

(P.T.O.)

15. A). Evaluate the longitudinal and transverse elastic modulus of a unidirectional glass/epoxy lamina with a 70% fiber volume fraction. Also, find the ratio of the load taken by the fibers to that of the composite, major and minor poisson's ratio of the composite. Take $E_f = 85 \text{ GPa}$, $\nu_f = 0.2$, $E_m = 3.4 \text{ GPa}$, $\nu_m = 0.3$. 10M

OR

15. B). i) Elaborate on the thermal properties of composites and hydrothermal stresses. 5M
ii) State and explain Halpin-Tsai equation. 5M
