

Enroll No

K.E.Society's  
**Rajarambapu Institute of Technology, Rajaramnagar**  
 (An Empowered Autonomous Institute, Affiliated to SUK)  
 End Semester Examination (Nov./Dec. 2025)  
 S.Y.B.Tech. Robotics & Automation III

Q.P.Code
E1285

**Course Code:** RA209

**Course Name:** Materials and Manufacturing Technology

Day & Date: Wednesday 12/11/2025

Time : 2:30 To 5:30

Max Marks: 100

- Instructions:**
- 1) All questions are compulsory.
  - 2) Figures in rounded ( ) brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
  - 3) CO is the index number of the Course Outcome statement.
  - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate and create respectively.
  - 5) Assume suitable data if necessary.
  - 6) Use of non-programmable calculators is allowed

**Q.1 Answer the Following**

	Mark	COs	BT Level
(a) Analyze the effect of crystal structure on optical (2) and mechanical (3) properties of material.	5	CO_1	4
(b) How does the phase transformation in the iron-iron carbide diagram affect the mechanical properties of steel, and how can this knowledge be applied to optimize material selection?	5	CO_1	3
(c) Compare low carbon steel and High Carbon steel (1 each)	5	CO_1 ,2	3

**OR**

(c) Select the material for following applications and justify your choice (1 each)		CO_1 ,2	3
i. crushing tool			
ii. Robot frames			
iii. Pipe fittings			
iv. Food container			
v. Milling Machine base			

**Q.2 Answer the Following**

(a) Write similarities (3) and differences (2) between elastomers and polymers	5	CO_1	2
(b) How do environmental factors, such as temperature, humidity, and UV exposure, affect the long-term performance and durability of FRP?	5	CO_1	4
(c) Write working principle (3) of chromoactive material and its application (2) in robotics and automation sector.	5	CO_1 ,2	3



OR

- (c) How does the unique property of shape memory in SMA influence its applications in robotics and automation, and what factors determine its effectiveness in these applications? CO\_1 3  
,2

**Q.3 Answer the Following**

- (a) Differentiate between sand casting and die casting (1 each) 5 CO\_3 2  
(b) Explain step by step procedure of investment casting. 5 CO\_3 2  
(c) What is milling? (1) Write classification (2) and applications (2) of milling operation. 5 CO\_3 3

OR

- (c) Suggest suitable machining process with sequence for following Components CO\_3 3

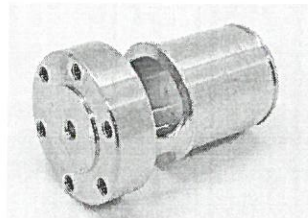


Fig. 3.c

**Q.4 Answer the Following**

- (a) Classify (2) forming processes and explain (3) Rolling. 5 CO\_3 2  
(b) What do you mean by Roll pass sequence? (2) Discuss the factors affecting roll pass sequence (3). 5 CO\_3 2  
(c) A thin metal sheet needs to be bent into a specific angle without cracking or excessive deformation. Which sheet metal operation would you choose: bending, drawing, or shearing? (2) Justify your choice (3). 5 CO\_3 3

OR

- (c) In which situations forging hammers are preferred over forging press. CO\_3 3

**Q.5 Answer the Following**

- (a) Classify (2) welding processes and Explain (3) Gas Welding 5 CO\_3 2  
(b) Compare TIG welding and MIG Welding (1 each) 5 CO\_3 2  
(c) Given a situation where dissimilar metals need to be joined, analyze which joining process would be most suitable(2) and why (3)? 5 CO\_3 3  
(d) Identify (2) possible defects in FCAW (Flux cored Arc) welds and explain (3) how process parameters affect their occurrence. 5 CO\_3 3



**OR**

- |   |      |   |
|---|------|---|
| (d) “Submerged Arc Welding is not suitable for thin sheet welding”,<br>Justify the statement. | CO_3 | 3 |
|---|------|---|

**Q.6 Answer the Following**

BL

- |   |   |      |   |
|---|---|------|---|
| (a) Explain Powder bed fusion method of additive manufacturing.                                   | 5 | CO_4 | 2 |
| (b) Explain how machine vision is used in robotic inspection with an industrial example.          | 5 | CO_4 | 2 |
| (c) Explain direct energy deposition method of additive manufacturing with neat sketch.           | 5 | CO_4 | 2 |
| (d) Analyze the role of CAM in improving productivity and reducing human errors in manufacturing. | 5 | CO_4 | 4 |

**OR**

- |   |      |   |
|---|------|---|
| (d) Evaluate the role of AI and cloud computing in future robotic inspection systems. | CO_4 | 4 |
|---|------|---|

