

Subject Code: R16CE4108

IV B.Tech I Semester Supple Examinations, April-2023

OPEN CHANNEL HYDRAULICS

(CE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

### PART-A

1. (a) Explain the terms specific energy of a flowing liquid, minimum specific energy.
- (b) Define gradually varied and spatially varied flow.
- (c) Differentiate between sub-critical and super-critical flow.
- (d) Define cavitation and how it can be avoided.
- (e) Describe multistage pumps.
- (f) Explain Dupuit Forchheimer assumption.

[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

2. (a) A trapezoidal channel has a bottom width of 2.50 m and depth of flow of 0.80 m. The side slopes are 1.5 horizontal: 1 vertical. The channel is lined with bricks ( $\epsilon_s = 3.0$  mm). If the longitudinal slope of the channel is 0.0003, estimate (i) the average shear stress, (ii) the hydrodynamic nature of the surface, (iii) Chezy C by using f, (iv) Manning's n, (v) the uniform flow discharge for cases (iii) and (iv). [09]
- (b) Differentiate between pipe flow and open channel flow. [03]
3. Derive the differential equation of G.V.F. in a rectangular channel of variable width B with stating assumptions, in the following form:

$$\frac{dy}{dx} = \frac{s_o - s_f + \left( \frac{Q^2 y}{g A^3} \frac{dB}{dx} \right)}{1 - \frac{Q^2 B}{g A^3}}$$

and hence show that for a horizontal, frictionless rectangular channel of varying width B, it reduces to

$$(1 - f^2) \frac{dy}{dx} - f^2 \left( \frac{y}{B} \right) \frac{dB}{dx} = 0$$

Where f = Froude number

[12]

4. (a) Obtain the end-depth ratio  $\eta = (y_e/y_c)$  for a triangular channel having (a) subcritical flow and (b) supercritical flow with a Froude number of 2.5. [07]
- (b) A hydraulic jump takes place in a horizontal triangular channel having side slopes of 1.5H: 1V. The depths before and after the jump are 0.40m and 1.50m respectively. Estimate the flow rate and Froude number at the beginning and end of the jump. [05]

5. (a) A Kaplan turbine develops 15000 kW power at a head of 30 m. The diameter of the boss is 0.35 times the diameter of the runner. Assuming a speed ratio of 2.0, a flow ratio of 0.65 and overall efficiency of 90%, calculate the (i) diameter of the runner (ii) rotational speed, and (iii) specific speed. **[06]**
- (b) Explain the various similarity laws in turbines. **[06]**
6. (a) A centrifugal pump has an impeller of 80 cm diameter and it delivers at  $1.1 \text{ m}^3/\text{s}$  against a head of 70 m. The impeller runs at 1000 rpm and its width at outlet is 8 cm. If the leakage loss is 4% of the discharge, external mechanical loss is 10 kW and hydraulic efficiency is 82%, calculate the blade angle at the outlet and overall efficiency. **[08]**
- (b) Explain in detail the concept of negative slip. **[04]**
7. (a) State the assumptions adopted in Theis method for predicting the drawdown. **[06]**
- (b) A 1m diameter well penetrates vertically through a confined aquifer 30 m thick. When the well is pumped at  $113 \text{ m}^3/\text{hr}$ , the drawdown in a well 15 m away is 1.8 m; in another well 50 m away, it is 0.5 m. What is the approximate head in the pumped well for steady-state conditions and what is the approximate drawdown in the well? Also compute the transmissivity of the aquifer and the radius of influence of the pumping well. Take the initial piezometric level as 40 m above the datum. **[06]**

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Subject Code: R16CE4114

**IV B.Tech I Semester Supple Examinations, April-2023**

**PHOTOGRAMMETRY AND REMOTE SENSING**

**(CE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1. (a) What is the difference between image and photograph
- (b) What is orthorectification and ortho mosaic
- (c) Define Crab and Drift
- (d) What is EMR and atmospheric window
- (e) List different type of sensor platforms
- (f) What is meant by image enhancement

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2. (a) Explain with neat sketch , scale of a vertical photograph over variable terrain
- (b) Discuss in detail about relief displacement with neat sketch
3. (a) Discuss about digital photogrammetry and compare it with analytical systems
- (b) Discuss in detail about concept of orientation in photogrammetry
4. (a) How to calculate end lap, over lap and interval between exposures of a flight plan
- (b) Explain in detail about stereoscopic parallax in photogrammetry
5. (a) What are the types of sensor resolutions. Explain?
- (b) Explain all the four EMR laws
6. (a) Discuss about various Multi spectral scanners
- (b) What are the payloads and sensor specifications of Landsat 8
7. (a) What are the sources of errors in satellite data analysis
- (b) Explain in detail about Image classification and accuracy assessment

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Subject Code: R16ME4101

IV B.Tech I Semester Supple Examinations, April-2023

FINITE ELEMENT METHODS

(ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

### PART-A

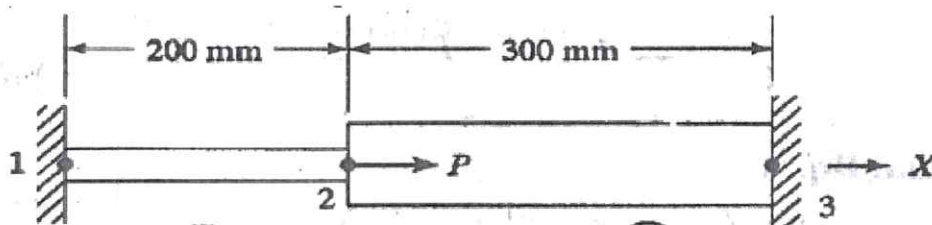
1. (a) What is the shape function? Give its practical importance.
- (b) Write the stiffness matrix for 1-d element with linear interpolation functions.
- (c) What is CST element.
- (d) Write down the expression of stiffness matrix for a beam element.
- (e) What are the practical importance of Eigen values and Eigen vectors.
- (f) How principle of minimum potential energy is useful in dynamic analysis of systems.

[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

2. (a) Derive the equations equilibriums for 3-D body [6]
  - (b) Describe advantages, disadvantages and applications of finite element analysis. [6]
3. An axial load  $P=300 \times 10^3\text{N}$  is applied at  $20^\circ\text{C}$  to the rod as shown in Figure below. [12]  
The temperature is the raised to  $60^\circ\text{C}$ .
- a) Assemble the K and F matrices.
  - b) Determine the nodal displacements and stresses.



FIGURE

①  
Aluminum

$$E_1 = 70 \times 10^9 \text{ N/m}^2$$

$$A_1 = 900 \text{ mm}^2$$

$$\alpha_1 = 23 \times 10^{-6} \text{ per } ^\circ\text{C}$$

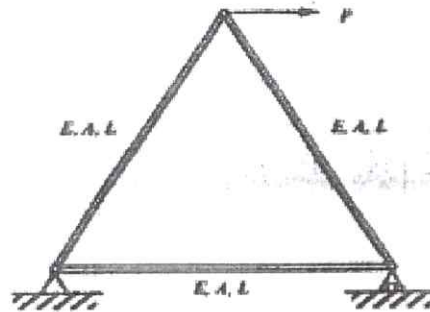
②  
Steel

$$E_2 = 200 \times 10^9 \text{ N/m}^2$$

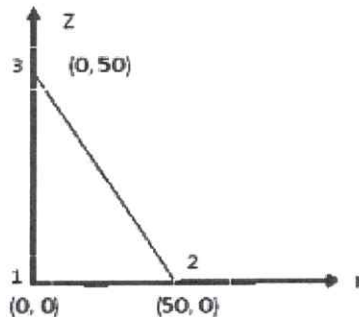
$$A_2 = 1200 \text{ mm}^2$$

$$\alpha_2 = 11.7 \times 10^{-6} \text{ per } ^\circ\text{C}$$

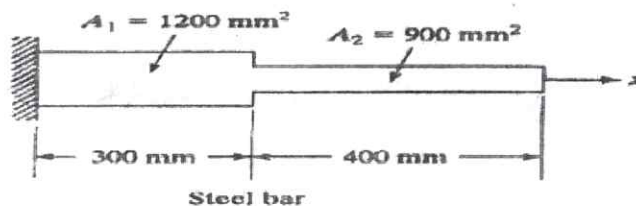
4. For the truss shown in figure establish the element stiffness matrices and assemble the global stiffness matrix for the active degrees of freedom and determine a) Nodal displacements  
b) Stress in the members and c) The reaction at the roller support, Take  $E = 100 \text{ GPa}$ . Area of c/section =  $100 \text{ mm}^2$  Length =  $100 \text{ cm}$ ,  $P = 100 \text{ kN}$  [12]



5. For axisymmetric element shown in figure, determine the strain-displacement matrix. Let  $E = 2.1 \times 10^5 \text{ N/mm}^2$  and  $\nu = 0.25$ . The co-ordinates shown in figure are in millimeters. [12]



6. (a) What are different thermal applications of finite element analysis. Compare the structural analysis with thermal analysis. [6]  
 (b) Calculate the temperature distribution in the fin of  $10 \text{ mm}$  diameter, which is exposed to the convective coefficient of  $40 \text{ W/m}^2 \text{ K}$  with  $300 \text{ C}$ . The base of the fin is exposed to a heat flux of  $450 \text{ kW/m}^2$  and the thermal conductivity of fin material is  $30 \text{ W/m K}$ . [6]
7. Consider axial vibration of the steel bar shown in Fig. a) Develop the global stiffness and mass matrices b) By hand calculations, determine the lowest natural frequency and mode shape 1 and 2. [12]



$E = 70,000 \text{ MPa}$   
 $\nu = 0.3$   
 $\rho = 7840 \text{ kg/m}^3$

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Subject Code: R16ME4102

IV B.Tech I Semester Supple Examinations, April-2023

CAD/CAM

(ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

### PART-A

1. (a) How plotters are different from printers? Mention the merits of plotters?
- (b) Differentiate Bezier and B-splines?
- (c) Explain sweep representation?
- (d) Discuss on CNC Part Programming?
- (e) What is Cellular Manufacturing?
- (f) What are the advantages and Limitations of the usage of Computer- aided testing in computer-aided quality control systems?

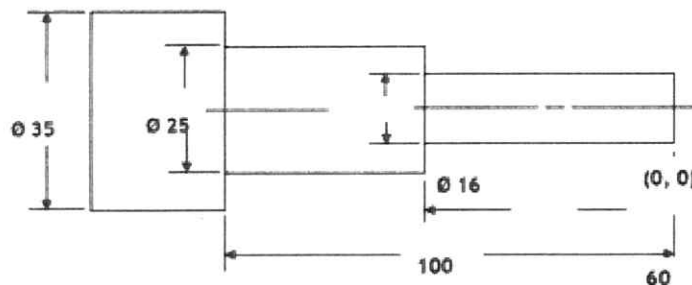
[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

2. (a) What do you understand by the CPU and ALU? List the advantages of computer aided design?
- (b) Derive the combined transformation matrix for rotation of an object around a line in 3D space.
3. (a) A cubic Bezier curve is defined by the control points as (1, 3), (4, 5), (5, 7) and (8, 4). Find the equation of the curve and calculate the point at  $U = 0.4$  and  $U = 0.6$
- (b) Explain surface modelling of spherical surface, Composite surface?
4. (a) Discuss different geometric commands used in CAD software?
- (b) Describe the importance and limits of solid modelling over surface and wire frame modelling.
5. (a) Write a CNC Turning Programming for the figure 1

01 (All dimensions are in mm).



- (b) Explain the APT statements.  
i) GOTO and GO/TO ii) GOBACK and GODLTA iii) INTOL and OUTTOL
6. (a) What factors must be considered while selecting a classification and coding system?  
(b) Explain Quantitative analysis in Cellular Manufacturing, Rank Order, Clustering Method?
7. (a) What is meant by CAPP? Discuss about the working of a variant CAPP system with a neat sketch  
(b) Discuss various types of contact inspection methods with neat diagram

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**Subject Code: R16ME4103**

**IV B.Tech I Semester Supple Examinations, April-2023**  
**ADVANCED MANUFACTURING PROCESSES**  
**(ME)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1. (a) List the applications of ceramic shell casting.
- (b) State the Principle EBW.
- (c) What are the advantages forming processes.
- (d) Name different gases used in AJM.
- (e) List the elements used in the Electro Chemical Machining process.
- (f) List few applications of Electron Beam Machining process?

**[2+2+2+2+2+2]**

**PART-B**

**4 X 12 = 48**

2. (a) Describe about metal injection moulding with the help of a neat sketch. [6M]
- (b) Explain about Vacuum mould casting and list the disadvantages. [6M]
3. (a) Explain working principle, process parameters of Laser beam welding process with neat sketch and State the advantages, disadvantages. [6M]
- (b) Distinguish between EBW and LBW. [6M]
4. (a) What is High Velocity Forming (HVF)? Discuss the advantages of High Velocity Forming. [6M]
- (b) Explain design for forming and forming of thin sections. [6M]
5. (a) Write the factors that affects the performance of WJM process. Discuss their effects in brief. [6M]
- (b) What is Abrasive flow finishing process? Explain with a neat sketch. [6M]
6. (a) In ECM operation of pure iron an equilibrium gap of 2 mm is to be kept. Determine supply voltage, if the total overvoltage is 2.5 V. The resistivity of the electrolyte is 50  $\Omega$ -mm and the set feed rate is 0.25 mm/min. [6M]
- (b) Draw a neat sketch of Electro Chemical Machining process scheme and explain. [6M]
7. (a) Discuss on the Process parameters of Electron beam machining. [6M]
- (b) A laser beam with a power intensity of  $2 \times 10^5$  W/mm<sup>2</sup> falls on a stainless steel sheet. Find out the time required for the stainless steel surface to reach the melting temperature, assuming that only 8% of the beam power is absorbed. Use suitable values for the thermal properties of stainless steel. Given  $\alpha = 0.071$ cm<sup>2</sup> / sec.  $k = 0.27$  W/ cm- °C, and  $\theta_m = 1455$ °C. [6M]

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Subject Code: R16ME4104

**IV B.Tech I Semester Supple Examinations, April-2023**

**POWER PLANT ENGINEERING**

**(ME)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1.	a)	What is effect of regeneration in rankine cycle?
	b)	Explain the function of cooling tower?
	c)	What is pulverized fuel firing?
	d)	Write the function of moderator
	e)	Explain the importance of governing of turbine.
	f)	What are the different types of electrical loads?

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2.	a)	Explain the working principle of Nuclear power plant.	[6M]
	b)	What are the different components used in steam power plant. Explain its functions.	[6M]
3.		Explain in detail with relevant sketch, the working of Fluidized bed boilers.	[12M]
4.	a)	Describe the working of vacuum extraction ash handling system.	[6M]
	b)	Discuss the natural draught in a chimney.	[6M]
5.	a)	Draw the line diagram and explain the pressurized water reactor and its limitations.	[6M]
	b)	List the essential components of gas turbine power plant and explain them briefly.	[6M]
6.	a)	Describe the various methods used for starting diesel engine. Describe the correct sequence of steps for starting and stopping procedure.	[6M]
	b)	Explain the effect of supercharging on the performance of Diesel engine.	[6M]
7.	a)	Explain the methods to reduce the power generation costs.	[6M]
	b)	Discuss briefly methods available to control pollution from power plants.	[6M]

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Subject Code: R16ME4111

**IV B.Tech I Semester Supple Examinations, April-2023**

**PRODUCTION PLANNING AND CONTROL**

**(ME)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

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**PART-A**

1. (a) List the objectives PPC
- (b) Describe the importance of forecasting
- (c) Define inventory control
- (d) Define routing
- (e) Define scheduling
- (f) Define Dispatching

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) Describe the functions of Production planning and control. 6M
- (b) Explain elements of production control. 6M
3. (a) Discuss the Delphi method. 6M
- (b) Discuss the exponential smoothing method. 6M
4. (a) Discuss ABC analysis 6M
- (b) Discuss JIT and KANBAN 6M
5. (a) Describe the routing procedure 6M
- (b) Describe the bill of material 6M
6. (a) Differentiate scheduling with loading. 6M
- (b) Differentiate flow production scheduling with batch production scheduling. 6M
7. (a) Describe the dispatching procedure
- (b) List out the applications of computers in production planning and control.

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Subject Code: R16EC4101

**IV B.Tech I Semester Supple Examinations, April-2023**  
**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**  
**(ECE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1.

- (a) Define and Differentiate class and object.
- (b) How to define a package in Java?
- (c) Define constructors. List its special properties.
- (d) Define and Differentiate thread and a process.
- (e) Write a note on exceptions
- (f) What is adapter class

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

- 2. (a) Explain any five object oriented features supported by java with examples  
(b) Write a program to demonstrate hierarchical and multiple inheritance using interface s
- 3. (a) What is method overloading? can you define two methods that have same name but different parameter types? Can you define two methods in class that have identical method names and parameter profile with different return values types or different modifier?  
(b) Distinguish between Inheritance & Polymorphism.
- 4. (a) Explain the life cycle of thread.  
(b) Explain how to stop and resume a thread
- 5. (a) Discuss about garbage collector  
(b) Explain about command line arguments
- 6. (a) Explain different layout managers.  
(b) Demonstrate working of radio button and Text Field with example code
- 7. (a) Explain the life cycle of applet.  
(b) Write a short note on delegation event model.

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Subject Code: R16EC4110

**IV B.Tech I Semester Supple Examinations, April-2023**

**RADAR SYSTEMS**

**(ECE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1. (a) Write the maximum Radar range equation and describe the parameters.
- (b) Draw the block diagram of Pulse Rader.
- (c) Explain the filter characteristics of MTI Radar.
- (d) Define the principle of operation of sequential Lobing Radar.
- (e) Define power gain and aperture efficiency of Radar antenna.
- (f) List out the function of duplexer.

**[2+2+2+2+2+2]**

**PART-B**

**4 X 12 = 48**

2. (a) Explain the Radar block diagram and its operation with simple form of Radar equation. [6M]
- (b) Differentiate between coherent and non-coherent detection in Radar. [6M]
3. (a) Explain the CW Radar in detail with block diagram and principle of operation. [6M]
- (b) List out and explain the application of FMCW Radar. [6M]
4. (a) Explain the power amplifier and oscillator transmitter of MTI Radar. [6M]
- (b) Explain the equipment instability and internal fluctuation of MTI Radar. [6M]
5. (a) Explain the difference types of tracking Radar. [6M]
- (b) Give a short note on hybrid tracking system. [6M]
6. (a) Explain the different types of reflector Antenna of Radar. [6M]
- (b) Discuss the response characteristics of matched filter receiver. [6M]
7. (a) Explain the functions of Radar receivers. [6M]
- (b) Explain the architecture of phased arrays of antenna. [6M]

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Subject Code: R16CS4110

**IV B.Tech I Semester Supple Examinations, April-2023**  
**MOBILE AD-HOC AND SENSOR NETWORKS**  
**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

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**PART-A**

1. (a) Define MANET
- (b) List the applications of multi casting.
- (c) List the mobility related solutions
- (d) Write the applications of WSN
- (e) Write the different types of channel allocation schemes
- (f) Write the sensor network programming challenges

[2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) Explain the AODV routing protocol.
- (b) Explain the Greedy routing approach
3. (a) Explain the MAODV routing protocol.
- (b) Explain the broadcast streaming problem with example
4. (a) Explain the TCP header with neat sketch
- (b) Explain the fairness related solutions
5. (a) Discuss about sensing and communication range in sensor networks
- (b) Discuss about heterogeneous sensors
6. (a) Explain the APTEEN protocol
- (b) Discuss about Sensor MAC protocol with neat sketch
7. Explain about node level software platforms

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Subject Code: R16CC41OE14

**IV B.Tech I Semester Supple Examinations, April-2023**

**ROBOTICS (OPEN ELECTIVE-III)**

**(ME)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

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**PART-A**

1. (a) **How** do you classify robots by coordinate system?
- (b) **What** are the types of End effectors
- (c) **List** out the types of Drive systems used in Robots.
- (d) **What** features are required for robot in spot welding.
- (e) **What** do you mean by homogeneous transformation?
- (f) **What** are the methods of teaching a robot?

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) **Explain** the different components of industrial robot.
- (b) **Discuss** in detail about Magnetic gripper with neat sketch.
3. (a) **Explain** the working principle of Pneumatic actuators.
- (b) **Briefly** explain the working principle of any two types of position sensors with neat sketches.
4. (a) **Discuss** the material transfer applications of robot?
- (b) **What** are the requirements of the robot for spray-coating applications?
5. (a) **Determine** the transformation matrix T that represents a translation of 'a' units along x-axis, followed by a rotation of ' $\beta$ ' about x-axis and followed by a rotation of ' $\theta$ ' about z-axis.
- (b) **Explain** forward kinematics and reverse kinematics for robotic manipulator?
6. **Derive** the jacobian matrix and find the linear and angular velocities of the end effector for a planar RR manipulator.
7. (a) **Explain** the steps involved in Trajectory planning.
- (b) **Discuss** briefly about Robot programming.

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