# Question Bank-Unit-1

Course: **Drive Systems for Robotics**
Course Code**: 22RI34**
Semester: **III , AY:2024-2025**

1) Describe the drive system and mention its types.

2) Mention the functions of drive system and list the objectives of drives.

3) Illustrate the typical applications of robotic drive systems.

4) Differentiate the open and closed control systems.

5) Describe the closed loop feedback control system with a block diagram.

6) Analyze the configuration of control system for robotic joint actuation with relevant block diagram.

7) Interpret the following controllers with mathematical equations (a) on-off (b) Proportional (c) Integral (d) Derivative.

8) Analyze the salient features with equations of Proportional-plus-Derivative controller (P-D).

9) Analyze the salient features with equations of Proportional-plus-Integral-plus-Derivative controller (P-I-D).

10) List the benefits of combining the Proportional _plus-integral controllers.

11) Describe the Power transmission system. List any three main forms of it.

12) Draw a sketch of Gears and illustrate the gear mechanism in robotic systems.

13) List the salient features of Power screws. Write the force applied equations of power screws.

14) Compare any six points of the chain drive with belt drive system.

15) Illustrate the features of Rope drive system.

16) Briefly describe the Harmonic gear system.

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## Question Bank-Unit-2

## Hydraulic Drives

Course: **Drive Systems for Robotics**
Course Code**: 22RI34**
Semester: **III , AY:2024-2025**

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1) Describe the Fluid Power system.

2) Mention any six advantages, disadvantages and four typical applications of Fluid Power system.

3) Briefly describe the Pascal's law with a neat sketch also mention its governing equation.

4) In a high pressure hydraulic cylinder, a force of 6500N is applied on a piston. The diameter of the piston is 180mm. What is the pressure acting on the fluid in the cylinder?(*Similar problems*)

5) With a neat sketch describe the structure of Hydraulic power system.

6) Illustrate the Hydraulic Pump and mention its categories.

7) Differentiate the Positive displacement pump and Negative displacement pumps.

8) With a neat sketch explain how the pressure is built by pumping and illustrate the operation of a pump. Mention the theoretical flow rate equation of the pump with abbreviations.

9) With a neat labelled diagram explain the working principle of external gear pump of fluid power systems.

10) Mathematically illustrate the Displacement, flow rate and volumetric efficiency of gear pumps.

11) With a neat sketch describe the single acting hydraulic cylinder.

12) With a neat sketch describe the double acting hydraulic cylinder.

13) Describe the hydraulic actuators or hydraulic gear motors.

14) Draw a neat sketch of Hydraulic/Pneumatic Direction Control Valve and describe it.

15) Write the symbolic representation of Hydraulic systems for example a double cylinder with double rod end.

16) With a neat sketch and symbol representation illustrate how fluid flows through 3-way or 4-way valve.

17) With a neat sketch and symbolic representation illustrate the operation of 4/2 Direction Control Valve or 4/3 Direction Control Valve.

18) Describe pressure control valves of hydraulics.

19) With a neat sketch explain the operation of Pressure Relief Valves(PRV) in fluid power systems.

20) Illustrate flow control valves. Mention its types.

21) Describe the construction of simple needle flow control valve.

22) With a neat circuit diagram of single acting hydraulic cylinder, describe its controlling process/working principle/functions.

23) With a neat circuit diagram of double acting hydraulic cylinder, describe its controlling process/working principle/functions.

24) With a neat circuit diagram of regenerative hydraulic cylinder, describe its controlling process/working principle/functions.

25) Mention typical advantages, disadvantages and applications of hydraulic systems.

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# Department of Robotics & Artificial Intelligence

## Question Bank-Unit-3

## Pneumatic Drives

Course: **Drive Systems for Robotics**
Course Code**: 22RI34**
Semester: **III , AY:2024-2025**

1. Describe the Pneumatic power system.

2. Mention the choices of selection of working medium.

3. With a neat sketch describe the Pneumatic power system.

4. Illustrate the production of compressed air with neat diagram.

5. Define air compressor.

6. With a neat diagram rotary air compressor.

7. Define air pressure regulator.

8. Describe the Pneumatic actuators and list its types.

9. Classify the types of air cylinders with a neat sketch.

10. With a neat sketch, describe the construction of double acting air cylinder.

11. Describe vane type of air motor with a diagram.

12. Draw a neat diagram of turbine type of air motor, mention its salient features.

13. List and illustrate the design parameters of pneumatic systems.

14. List the advantages of air motors.

15. Describe the Direction Control Valves and mentions its functions.

16. Briefly discuss the factors of classification of Direction Control Valves.

17. Write the symbol for 5/3 Direction Control Valve.

18. Describe the Flow control valve and write the graphical representation of Flow control valve.

19. With a neat sketch describe the Flow Control Valve.

20. With a symbolic representation describe the Filter Regulator Lubricator.

21. Design and describe the Direct actuation of pneumatic cylinder.

22. Design and describe the Direct actuation of pneumatic cylinder.

23. With a neat sketch describe the Cascade system of pneumatics.

24. List any five advantages, disadvantages and applications of pneumatic systems.


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# Department of Robotics & Artificial Intelligence

## Question Bank-Unit-4

## Electric Drives

Course: **Drive Systems for Robotics**
Course Code**: 22RI34**
Semester: **III, AY:2024-2025**

1. Define Faraday's law.

2. With a neat block diagram, describe the electric drive system.

3. Mention the important features of BLDC Motor.

4. Describe DC servo motor with mathematical equations.

5. Illustrate AC Motor characteristics.

6. Sketch and explain the stepper motor.

7. Mention the important characteristics of Servo motor.

8. Briefly explain the brushless DC Motor.

9. Describe the Power modular system.

10. With a neat diagram explain the Synchronous motor.

11. With a neat sketch describe the Solenoid actuator and list few typical applications.

12. Describe Switch Reluctance Motor.

13. Mention the typical advantages, disadvantages and applications of electrical drives.

14. Illustrate the Variable Frequency Drive along with its functions.

15. Describe the Direct drive systems.

16. Describe the good requirements of servo motor.

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# Department of Robotics & Artificial Intelligence

## Question Bank-Unit-5

## Electric drive characteristics and Programmable Logic Controllers (PLC)

Course: **Drive Systems for Robotics**

Course Code**: 22RI34**

Semester: **III , AY:2024-2025**

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1. Briefly describe the equations governing motor load dynamics.

2. Illustrate the steady state stability of motor.

3. Explain the discrete process control system along with its advantages.

4. Briefly describe the two important types of discrete process control.

5. Describe Programmable Logic Controller.

6. With symbols write the truth tables for AND, OR, NAND, NOR, NOT logic gates.

7. With a neat sketch explain the components of PLC.

8. With symbols describe Normally open, normally closed, output coil, timer, coil used in PLC.

9. With a neat diagram describe the ladder logic diagram.

10. Write a short note on PLC programming.

11. PLC simple problems on lamp circuit, push button switch, alarm, relay control.

12. With neat electric circuit diagram explain the logic AND gate along with truth table.

13. Briefly describe the SCADA (Supervisory Control and Data Acquisition) system

14. With neat electric circuit diagram explain the logic OR gate along with truth table.

15. Illustrate the components and working of SCADA.

16. Mention the broad applications of SCADA.

17. Illustrate the personal computer (PC) and soft logic control systems.

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