

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S6 (R,S) Examinations April 2026 (2019 Scheme)



Course Code: MRT306
Course Name: INDUSTRIAL HYDRAULICS & PNEUMATICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|---|-----|
| 1 | Differentiate between hydraulic and pneumatic systems. | (3) |
| 2 | Discuss Pascal's law with neat diagram. | (3) |
| 3 | With neat diagram explain how a 4 way spool valve operates | (3) |
| 4 | Explain the use of twin pressure valve and shuttle valve. | (3) |
| 5 | Discus about the advantage of frequency response analysis. | (3) |
| 6 | What are the limitations of reaction curve techniques? | (3) |
| 7 | Briefly explain the three methods of PLC programming. | (3) |
| 8 | Discuss about the cascade control system. | (3) |
| 9 | Define underlap and overlap in the context of servo valve spools. | (3) |
| 10 | What are the advantage of using servo systems? | (3) |

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

- | | | |
|----|---|-----|
| 11 | a) Illustrate with neat sketches how Open Centre, Closed Centre, and Tandem Centre designs in DCVs operate in hydraulic systems | (8) |
| | b) Explain how positive displacement pumps are classified. | (6) |

OR

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|----|---|-----|
| 12 | a) Explain about compound relief valve with neat sketch. | (8) |
| | b) Explain the concept of cylinder cushioning with a neat sketch. Illustrate any two common cushion designs | (6) |

Module II

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|----|--|-----|
| 13 | a) Describe the operation of an electro-hydraulic servo valve using a suitable block diagram | (8) |
| | b) State the uses of twin pressure valve and shuttle valve | (6) |

OR

- 14 a) Describe the construction and operation of a pressure-compensated flow control valve, supported with a neat schematic diagram. (7)
- b) Differentiate between Conventional and Proportionate valves (7)

Module III

- 15 a) Explain how analogue and digital control systems differ from each other in terms of design, advantages, limitations and implementation in modern automation. (9)
- b) Describe the roles of proportional, integral, and derivative actions in a PID controller (5)

OR

- 16 a) Describe various internal and external feedback devices used in modern control systems with necessary diagrams. How do they affect the performance of closed-loop systems? (14)

Module IV

- 17 a) Construct a ladder logic for the following Boolean equations and explain (8)
- (i) $Y = (X1+X2).X3$, (ii) $Y = (X1+X2).(X3+X4)$,
(iii) $Y = (X1.X2)+X3$, (iv) $Y = (X1+X2+X3)+X4$
- b) What is a cascade control system? Explain its principle of operation with an example (6)

OR

- 18 a) Explain the role of Ladder diagram in Industrial Control logic system (7)
- b) Explain the advantages of using fieldbuses in control circuits and automation systems (7)

Module V

- 19 a) Explain the Electro-Hydraulic Servo System with a neat diagram. Also, describe its application in velocity control with a suitable example (14)

OR

- 20 a) What is low-cost automation (LCA)? Explain how pneumatics is used in LCA with suitable examples. Discuss advantages and limitations. (14)
