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Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Sixth Semester B.Tech Degree Regular and Supplementary Examination June 2023 (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  | Discuss about Pressure relief valve and Pressure reducing valve.                     | (3) |
| 2  | Discuss about the purpose of pressure and temperature compensation in a spool valve. | (3) |
| 3  | Write the main advantages of using hydraulics over pneumatics.                       | (3) |
| 4  | Draw the ISO symbols of any 4 DCV's.   | (3) |
| 5  | Write and discuss about ramp used in control systems.                                | (3) |
| 6  | Write what are the limitations of reaction curve techniques?                         | (3) |
| 7  | Mention the role of PLC ladder diagram in various circuits.                          | (3) |
| 8  | Write a short note about sequencing circuits.  | (3) |
| 9  | List out the advantages of electro hydraulic servo systems.                          | (3) |
| 10 | Write about the role of timers and counters in pneumatic PID circuits.               | (3) |

**PART B**

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

**Module I**

- 11 a) Write the classification of positive displacement pumps also explain any two type gear pump with suitable diagram. (14)

**OR**

- 12 a) A gear pump has a 120 mm outside diameter a 90 mm inside diameter and a 30mm width. If the volumetric efficiency is 92% at rated pressure, what is the corresponding actual flow rate? The pump speed is 1200 rpm. (7)
- b) With neat sketches, explain the working of 'Open Center', 'Closed Center' & 'Tandem center' design in a DCV. (7)

**Module II**

- 13 a) What are the different types of proportional control devices used in advanced hydraulic system? (7)

- b) Explain construction and operation of a pressure compensated flow control valve with neat diagram. (7)

OR

- 14 a) Explain the working of a pilot operated pressure relief valve with neat sketch (7)  
b) Differentiate between Conventional and proportional valves (7)

**Module III**

- 15 a) What is PID control? Also write about PID. (4)  
b) Discuss the internal and external feedback devices used in control systems. (5)  
c) Explain the advantages of frequency response analysis. (5)

OR

- 16 a) Draw the block diagram and components of closed loop electro-hydraulic servo system. (8)  
b) State and explain open loop and closed loop control systems. (6)

**Module IV**

- 17 a) How can motion controllers be used in electrical control of fluid power? Explain with a suitable example. (5)  
b) How does ladder diagram help in circuit design? (5)  
c) Discuss about the benefits of using field busses in circuits? (4)

OR

- 18 a) Illustrate the use of sequence valve with a simple hydraulic circuit. (7)  
b) Explain about Karnaugh map method of circuit design? (7)

**Module V**

- 19 a) What are the applications of servo systems in process industry? (7)  
b) Write about how can low cost automation be achieved using pneumatics? (7)

OR

- 20 a) Explain in detail about the control of a hydraulic cylinder using limit switch with neat sketches and explain about different electrical components used in the system with its symbols. (7)  
b) How speed control is done with the help of meter-in, meter-out and bleed-off circuits. (7)

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