22655

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any <u>FIVE</u> of the following. **10**

a) State two advantages and two disadvantages of oil hydraulic systems.

b) Define term viscosity index

c) Draw ISO symbols of pressure compensated flow control valve with reverse free flow.

d) State two designs of fixed displacement pumps and two designs of variable displacement pumps. (names only)

e) Sketch a typical graph of performance characteristic of variable displacment vane pump.

f) Draw ISO symbols to show two different centre positions of DC valves.

g) Sketch a cross sectional diagram of a shuttle valve.

Marks

2. Attempt any THREE of the following. **12**

a) Sketch and explain working of unbalanced vane pump.

b) In mobile hydraulics application a single acting cylinder of very long stroke length is required. Due to space limitation it should occupy less space after refraction. Sketch and explain suitable actuator required for given condition.

c) State any two methods of actuation of DC valve with their symbols.

d) Draw a neat sketch and explain working of pressure and temperate compensated flow control valve.

3. Attempt any THREE of the following. **12**

a) Draw a cross sectional diagram of a time delay valve and explain its working.

b) Sketch and explain construction of pressure reducing valve.

c) Explain the construction of spring loaded accumulator with neat sketch.

d) Draw neat sketch of a lubricator used in Pneumatic systems.

e) Classify air compressors. Write any one application of each compressor.

4. Attempt any TWO of the following. **12**

a) Compare Relief and sequence pressure control valves on following points

i) Symbol

ii) Outlet port

iii) Pilot connection

iv) Drain

v) Application

b) Explain with neat sketch of Hydraulic circuit used in shaping machine.

c) In an application two hydraulic cylinders are required to move forward simultaneously with the same speed and same stroke length. Sketch a suitable circuit diagram and explain its working.

Marks

5. Attempt any TWO of the following. **12**

a) In a pneumatic application Piston has to move back and forth continuously. Draw pneumatic circuits using

i) Roller operated and pilot operated DC valves.

ii) Solenoid operated DC valve and limit switches.

b) Explain with neat sketch of pneumatic circuit used for speed control of air motor.

c) Explain constructional details of Internal Gear type hydraulic motor with neat sketch.

6. Attempt any THREE of the following. **12**

a) i) List two components used in pneumatic systems but not used in Hydraulic system with their symbols.

ii) Draw a cross section of Hose pipe used in Hydraulics and name the layers.

b) List common faults observed in Hydraulic and pneumatic systems and state their remedies.

c) With a suitable circuit diagram explain the use of shuttle valve (Logic 'OR' gate) in Pneumatic low cost automation. State its application.

d) Sketch a counter balance hydraulic circuit, name its parts.

Sample Question Paper:

Scheme – I

Programme Name : Mechanical Engineering

Programme Code : ME

Semester : Sixth

22655

Course Title : Industrial Hydraulics and Pneumatics

Marks :70 **Time:3Hrs.**

Instructions:

(1)All questions are compulsory.

(2)Illustrate your answers with neat sketches wherever necessary.

(3)Figures to the right indicate full marks.

(4)Assume suitable data if necessary.

(5)Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following. (10 Marks)

a) Compare oil and air as a medium in fluid system

b) Draw I.S. symbols for i) Bi directional variable discharge pump and ii) Heat Exchanger

c) State different types of pumps which are available in variable displacement designs

d) State two applications of double-acting cylinders

e) State the difference between pressure relief valve and sequence valve

f) State the use of twin pressure valve and shuttle valve

g) State the common faults that can be observed in pneumatic circuit

Q.2) Attempt any THREE of the following. (12 Marks)

a) List different Safety precautions required for handling Industrial hydraulics and pneumatics systems

b) Explain the working of vane motor with a neat sketch

c) Explain two applications of check valve with suitable diagram

d) Explain with neat sketch working of screw compressor

Q.3) Attempt any THREE of the following. (12 Marks)

a) Compare Gear pump and Piston pump (4 imp point)

b) Explain the need of pressure and temperature compensation in flow control valve

c) Out of the three speed control methods, select the suitable one for hydraulic shaper and explain it with circuit diagram

d) A machine holds the steel sheet and then punches a hole. The sheet is released when the punch goes back. Suggest and draw the suitable circuit for this situation

Q.4) Attempt any Three of the following. (12 Marks)

a) Give full classification of control valves used in fluid system

b) Explain with neat sketch working of Pressure reducing valve

c) State any four types of accessories used in pneumatic system along with their function

d) Draw and explain a suitable circuit in which two actuators move forward simultaneous with same speed

e) Draw and explain the circuit diagram to control speed of the single acting hydraulic cylinder using air-oil reservoir in hydro pneumatic system

Q.5) Attempt any TWO of the following. (12 Marks)

a) One application needs a single acting cylinder capable of giving longer stroke strength. However the space available to fit in that cylinder in retracted condition is comparatively less. Suggest the type of actuator to be used in such condition with justification. Explain its working with sketch.

b) Discuss the situations in which following types of center positions of DC valves are preferred i) All ports open and ii) Tandem center

c) It is required to delay the controlling action by sometime after the actuation of DC valve. Select the suitable valve for this application and explain its working with neat sketch

Q.6) Attempt any TWO of the following. (12 Marks)

a) Draw and explain two pump unloading circuit

b) A hydraulic press machine can be operated from both the sides. Draw a pneumatic circuit which ensures both hands safely of the worker while operating the machine from any side

c) Design and draw a hydraulic circuit to achieve following objectives i) piston advances with uniform speed in the first half of forward stroke, ii) with reduced speed in the next half of forward stroke and iii) return quickly

Sample Test Paper I

Scheme – I

Programme Name : Mechanical Engineering

Programme Code : ME

22655

Semester : Sixth

Course : Industrial Hydraulics and Pneumatics

Marks : 20 Time: **1 hour**

Instructions: All questions are compulsory

1. Illustrate your answers with neat sketches wherever necessary
2. Figures to the right indicate full marks
3. Assume suitable data if necessary
4. Preferably, write the answers in sequential order

Q.1 Attempt any FOUR. **(8 Marks)**

a. State two main limitations of hydraulic system

b. Draw I.S. symbols for following : i) Gas charged accumulator ii) Oscillatory Motor

c. Differentiate between single acting and double acting cylinder

d. Classify flow control valves

e. Define Cracking pressure and Full flow pressure

f. State methods of actuation of DC valve

Q.2 Attempt any Three **(12 Marks)**

a. Explain with neat sketch working of Gear Pump

b. Explain with neat sketch working of tandem cylinder

c. Explain with neat sketch working of 4/2 spool type DC valve

d. Explain with neat sketch working of pressure relief valve

Sample Test Paper II

Scheme – I

Programme Name : **Mechanical Engineering**

Programme Code : **ME**

Semester : **Sixth**

22655

Course : **Industrial Hydraulics and Pneumatics**

Marks : **20** **Time:1 hour**

Instructions: All questions are compulsory

1. Illustrate your answers with neat sketches wherever necessary
2. Figures to the right indicate full marks
3. Assume suitable data if necessary
4. Preferably, write the answers in sequential order

Q.1 Attempt any FOUR. **(8 Marks)**

a. State the importance of FRL unit in pneumatic system

b. List various types of accessories used in hydraulic system

c. Compare meter in and meter out circuit

d. State the advantages of indirect controlling of actuators

e. Draw logic OR circuit

f. State one commonly occurring fault in hydraulic system along with its remedy

Q.2 Attempt any Three. **(12Marks)**

a. Explain with neat sketch working of quick exhaust valve

b. Draw and explain bleed off circuit

c. Draw and explain Regenerative circuit

d. Draw well labelled circuit for continuous back and forth motion of piston

22655

12223

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answer with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any <u>FIVE</u> of the following: **10**

a) Draw I.S. symbol for :–

i) $^{4}/_{3}$ D.C.V.

ii) Sequence valve.

b) Define :–

i) Viscosity

ii) Specific weight

c) State applications of Linear and Rotary actuator.

d) List various factors considering while selection of pump.

e) State the different functions of valves.

f) State the different types of filters used in fluid system.

g) State the common faults that can be observed in Pneumatic circuit.

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) State the advantages and limitations of hydraulic and pneumatic systems.

b) Explain the working of Tandem cylinder with neat sketch.

c) Explain the working of check valve with neat sketch.

d) Explain with neat sketch working of any one rotary compressor.

3. Attempt any THREE of the following: **12**

a) Compare gear pump and vane pump on the basis of :–

i) Construction

ii) Speed

iii) Application

iv) Pressure.

b) Explain the working of sequence valve with neat sketch.

c) Compare between meter in and meter out circuit.

d) A machine holds the steel sheet and then punches a hole. The sheet is released when the punch goes back. Suggest and draw the suitable circuit for this situation.

4. Attempt any THREE of the following: **12**

a) Explain with neat sketch working of $^{3}/_{2}$ DCV.

b) Give the classification of control valves.

c) Explain flexible hose. State its material and application.

d) Construct Pneumatic circuit using sequence valve to control two applications performed in a proper sequence and describe its working.

e) Draw the neat labelled hydraulic circuit of milling machine and explain its working.

Marks

5. Attempt any TWO of the following: **12**

a) Draw and explain two pump unloading circuit.

b) Mention any two faults detected in pneumatic circuit and give its causes and remedies.

c) Discuss the situations in which following type of centre position of DC valves are preferred :–

i) All ports open

ii) Tandem centre.

6. Attempt any TWO of the following: **12**

a) It is required to delay the controlling action by some time after the actuation of DC valve. Select the suitable valve for this application and explain its working with neat sketch.

b) One application needs a single acting cylinder capable of giving longer stroke strength. However, the space available to fit in that cylinder in retracted condition is comparatively less. Suggest the type of actuator to be used in such condition with justification. Explain its working with sketch.

c) Differentiate between Hydraulic and Pneumatic system. (Minimum six points.)