

Total No. of Questions : 12]

SEAT No. :

P3263

[5670]-531

[Total No. of Pages : 4

B.E. (Mechanical)

HYDRAULICS AND PNEUMATICS

(2015 Pattern) (Semester - I) (End Sem.) (402041)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer 6 questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain construction, working and application of external gear pump. [6]
b) State and Explain governing laws used in design of hydraulic system. [4]

OR

- Q2)** a) A gear pump has 75-mm outside diameter, a 50-mm inside diameter, and a 25-mm width. If the volumetric efficiency is 90% at rated pressure, what is the corresponding actual flow rate? The pump speed is 1000 rpm. [6]
b) State different selection criteria of pumps for hydraulic Power transmission system. [4]

- Q3)** a) State and Explain any two applications of accumulator. [4]
b) Draw Types of cylinders and mountings with their names. [6]

OR

- Q4)** a) State design considerations for cylinders, explain concept of Cushioning of cylinders. [6]
b) Draw symbols for [4]
i) Sequence valve
ii) Cushioned cylinder
iii) Double acting pressure - intensifier
iv) Unloading valve
v) Reversible motor
vi) Pilot operated pressure reducing valve
vii) Accumulator
viii) Hose

P.T.O.

Q5) Explain construction working and application of Hydraulic Components Any two. [10]

- a) Direction Control Valves 4/3
- b) Flow Control Valves - Pressure compensated
- c) Pressure reducing valve
- d) Servo Valves

OR

Q6) Explain construction working and application of Hydraulic Components - Any Two. [10]

- a) Relief Valve Direct Acting
- b) Cartridge Valves
- c) Counter Balance Valve
- d) Unloading Valve

Q7) a) Draw Speed control (Meter in, Meter out and bleed off) circuit. [6]

b) Draw Regenerative circuit, state its importance. [6]

OR

Q8) a) Write note on Contamination and sources of contamination. [6]

b) Draw motor breaking circuit. [6]

Q9) a) Explain Principles of Pneumatics and laws. [6]

b) State application of pneumatics in low cost automation and in industrial automation with example. [8]

OR

Q10) a) Write note on pneumatic actuators. [8]

b) State industrial applications of vacuum. [6]

Q11)a) State design procedure of hydraulics circuit for any practical application using manufacture catalogue. [6]

b) Sequential operations of two pneumatic cylinders are required as follows :

- i) Cylinder "A" extends,
- ii) Cylinder "B" extends,
- iii) Cylinder "B" retracts,
- iv) Cylinder "A" retracts,

Develop a pneumatic circuit using starting valve, pilot operated 5/3 or 5/2 direction control valve and cam/roller operated valves to maintain proper sequence. Do not use solenoid operated valves. [8]

OR

Q12)A machine slide is moved by means of hydraulic cylinder. The motion of the cylinder is as follows:

- a) Initially it moves through a distance of 250 mm against a load of 15000N in about 5 seconds.
- b) It is followed by a working stroke of 100 mm against an effective load of 35000 N. The feed rate during this part of the stroke is required to be between 0.5 to 1.0 m/min.
- c) The return stroke is to be as fast as possible.

A meter out circuit is to be used. Draw a circuit which will fulfill these requirements.

Select different components you have used in the circuit from the given data.

Note: Data sheet for question no. 12. [14]

(a) Suction strainer:

Model	Flow Capacity (lpm)
S ₁	38
S ₂	76
S ₃	152

(b) Pressure gauge:

Model	Range (bar)
PG ₁	0 - 25
PG ₂	0 - 40
PG ₃	0 - 100
PG ₄	0 - 160

(c) Vane pump:

Model	Delivery in lpm		
	At 0 bar	At 35 bar	At 70 bar
P ₁	8.5	7.1	5.3
P ₂	12.9	11.4	9.5
P ₃	17.6	16.1	14.3
P ₄	25.1	23.8	22.4
P ₅	39.0	37.5	35.6

(d) Relief valve:

Model	Flow capacity (lpm)	Max. working pressure & bar
R ₁	11.4	70
R ₂	19.0	210
R ₃	30.4	70
R ₄	57.0	105

(e) Flow control valve:

Model	Working pressure (bar)	Flow range (lpm)
F ₁	70	0 - 4.1
F ₂	105	0 - 4.9
F ₃	105	0 - 16.3
F ₄	70	0 - 24.6

(f) Directional control valve:

Model	Max. working pressure & bar	Flow capacity (lpm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

(g) Check valve:

Model	Max. working Pressure & bar	Flow capacity (lpm)
C ₁	210	15.2
C ₂	210	30.4
C ₃	210	76

(h) Pilot operated check valve:

Model	Max. working Pressure (bar)	Flow capacity (lpm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

(i) Cylinder (Max. working pressure 210 bar)

Model	Bore diameter (mm)	Rod diameter (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	50

(j) Oil reservoirs:

Model	Capacity (litres)
T ₁	40
T ₂	100
T ₃	250
T ₄	400
T ₅	600

x x x