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## Question Paper Code : X 20832

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Seventh Semester
Mechanical Engineering
ME 6021  – HYDRAULICS AND PNEUMATICS
(Regulations 2013)

Time : Three Hours                                                  Maximum : 100 Marks

Answer ALL questions

PART – A                                          **(10×2=20 Marks)**

1.  Define Pascal's Law.

2.  Differentiate external and internal gear pump.

3.  State the need of Pressure switches in fluid power industry.

4.  Sketch the push and pull type gravity return type single acting cylinder.

5.  State the working principle of gas charged accumulator.

6.  Why cylinder speed during forward stroke is different from return stroke ? In which stroke speed is lesser ?

7.  Which type of compressors preferred for pneumatic system ? Why ?

8.  What are SPST and DPST switches ?

9.  The oil in the reservoir is noticed to be foaming. What could be the trouble and how will you sort out this issue ?

10. State the use of group changing valve used in cascade circuit design.

PART – B **(5×13=65 Marks)**

11. a) A force of P = 850 N is applied to the smaller cylinder of a hydraulic jack as shown in figure. The area A of the small piston is 15 cm$^2$ and the area A of the larger piston is 150 cm$^2$. What load W can be lifted on the larger piston i) if the pistons are at the same level, ii) if the large piston is 0.75 m below the smaller one ? The mass density ρ of the liquid in the jack is 200 kg/m$^3$.
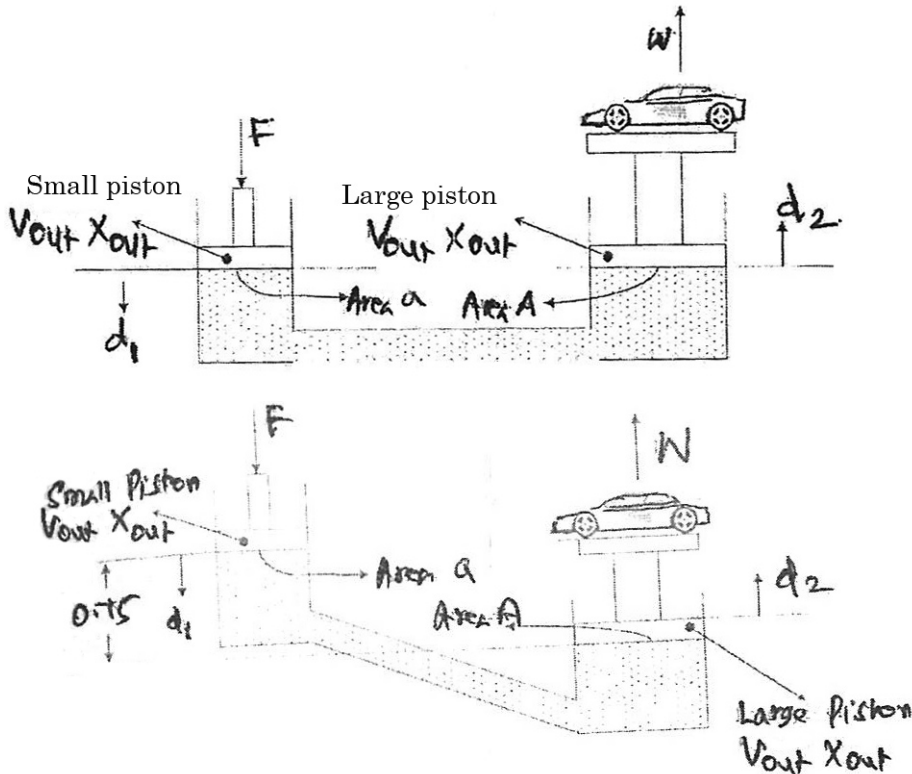


(OR)

b) With a neat sketch, discuss the function of any one fixed and variable displacement pump.

12. a) With the help of 4/3 tandem neutral DCV develop a hydraulic circuit to control double acting cylinder. Also discuss the function of such circuit.

(OR)

b) i) Explain the function of meter-in and meter-out flow control valve. **(8)**

ii) With valid reason, justify the need of pressure intensifier in fluid power circuit. **(5)**

13. a) With suitable diagram explain any 2 cylinder synchronizing circuit.

(OR)

b) What is servo valve ? How automotive power steering is accomplished with the help of mechanical hydraulic servo system ? Explain with a neat sketch.

14. a) What do you understand by the term 'Air preparation' ? What devices make and FRL unit ? Using a neat sketch explain the working method of FRL unit.

(OR)

b) Discuss the function of anyone bistable and monostable flip-flop device.

15. a) Draw and explain a hydraulic circuit to actuate a shaping machine ram incorporate the following features in the circuit.
   i)   rapid tool approach
   ii)  slow cutting operation and
   iii) rapid tool retraction/return

(OR)

b) i) Discuss the troubleshooting activities involved in hydraulic components of Pump and Cylinder. **(8)**
   ii) Write short note on 'Low Cost Automation'. **(5)**

PART – C **(1×15=15 Marks)**

16. a) Design and explain the fluid power circuit for a drilling machine to discuss the following functions. i) clamping the work piece ii) drilling the work piece iii) unclamping the work piece.

(OR)

b) i) A pump supplies oil at 0.0016 m$^3$/s to a 40 mm diameter double-acting hydraulic cylinder. If the load is 5000 N (extending and retracting) and the rod diameter is 20 mm, find the
   1) Piston velocity during the extending and retracting stroke.
   2) Hydraulic pressure during the extending and retracting stroke.
   3) Cylinder kW power during the extending and retracting stroke. **(10)**
   ii) A hydraulic motor has a 82 cm$^3$ volumetric displacement. If it has a pressure rating of 70 bar and it receives oil from a 36 lpm theoretical flow rate pump, find the motor speed, motor theoretical torque and power. **(5)**

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