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<b>Question Paper Code : 70819</b>
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B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Mechanical Engineering

ME 6021 — HYDRAULICS AND PNEUMATICS

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

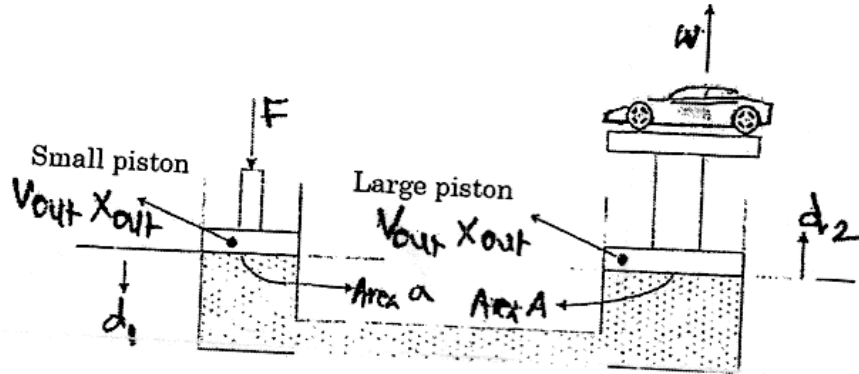
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is hydraulic power especially useful when performing heavy work?
2. List five fields of application where fluid power can be used more effectively than other power sources.
3. How offset angle of a swash plate type inline piston pump influence the flow rate?
4. What is barrel and plunger in telescopic 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. What is air Pump and mention its application?
8. What is AND valve? Draw its graphic symbol.
9. What is hydraulic Power pack?
10. List the advantages of PLC over electromechanical relay control systems.

PART B — (5 × 13 = 65 marks)

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



Or

- With a neat sketch, discuss the function of any one fixed and variable displacement pump.
12. (a) (i) Calculate the pipe bores required for the suction and pressure lines of a pump delivering  $40 \text{ Litre/min}$  using a maximum flow velocity in the suction line of  $1.2 \text{ m/s}$  and a maximum flow velocity in the pressure line of  $3.5 \text{ m/s}$ . (6)
- (ii) List the various parameters that affects the selection of a particular type of pump. (7)

Or

- Using relevant sketch, explain the function of compound pressure relief valve. (8)
    - Draw a schematic of 'Pressure reducing valve' and explain its function. (5)
13. (a) Draw and explain the working of a sequencing circuit.

Or

- Explain the construction and working of a mechanical hydraulic servo system with a neat sketch.

14. (a) Explain the components of pneumatic system. State the reasons for Considering the use of pneumatic systems instead of hydraulic systems.

Or

- (b) Discuss with neat sketches the construction and working of air filter and air pressure regulator.
15. (a) Develop an electro-pneumatic circuit by cascade method for the sequence of  $A^+B^+B^-A^-$  where A and B are double acting pneumatic cylinders, sin of + and – indicates forward and return stroke of cylinders respectively.

Or

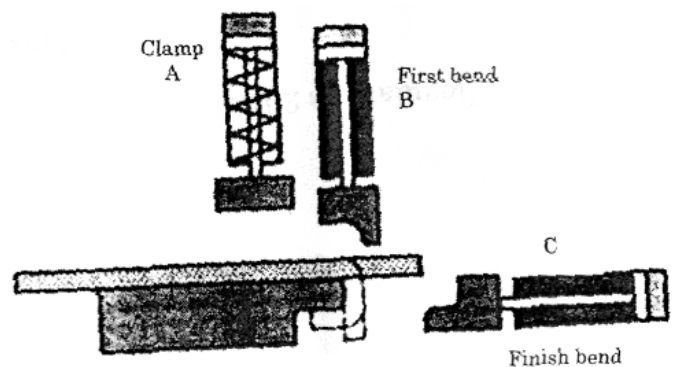
- (b) Discuss the following :

(i) Need and benefits of Low cost automation (6)

(ii) Need of PLC in fluid Power industry. (7)

PART C — (1 × 15 = 15 marks)

16. (a) Metal sheets are to be flanged on a Pneumatically operated bending tool as shown in the figure. After clamping the component by means of a single-acting clamping cylinder A, it is bent over by a double-acting cylinder B and subsequently finish bent by another double-acting cylinder C. The operation is initiated by a manual button. The circuit is to be designed such that one working cycle is completed each time a start signal is given Develop the pneumatic circuit for the given sequence of operation using cascade method.



Or

- (b) With suitable sketches explain :

(i) A Practical use of a pneumatic back pressure sensor

(ii) Construction of a hybrid sensor amplifier for pneumatic logic circuits

(iii) Use of fluidic mono stable OR–NOR devices in circuit. (5 + 5 + 5)