

B.TECH SEM – VI (2007 COURSE) (PRODUCTION ENGG.) :

WINTER - 2017

SUBJECT: FLUID MECHANICS & MACHINE TOOL CONTROL SYSTEM

Day: **Tuesday**
Date: **21/11/2017**

W-2017-2530

Time: **10.00 AM TO 01.00 PM**
Max. Marks: 80

N.B.:

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of the remaining attempt any **TWO** section from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers both the sections should be written in **SEPARATE** answer books.
- 4) Draw neat diagrams **WHEREVER** necessary.
- 5) Assume suitable data if necessary.

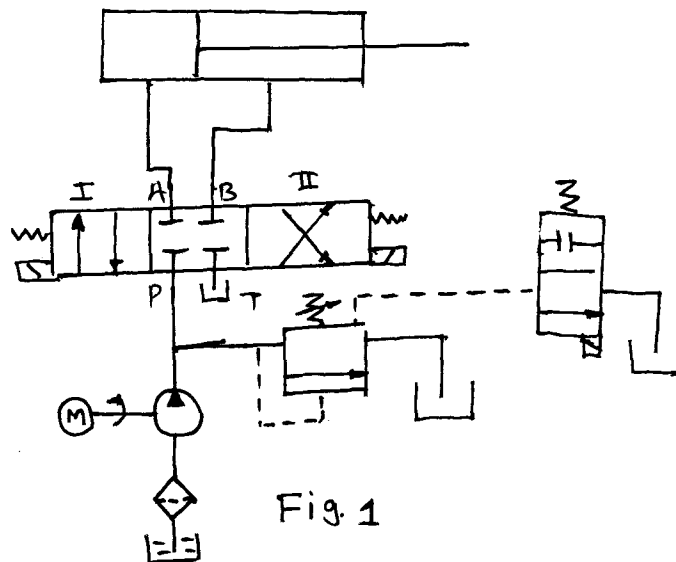
SECTION-I

- Q.1 a)** What is Reynolds's number? How the fluid flow is classified according to Reynolds's number? **(05)**
- b)** A stream function is given by $\Psi = 3xy$. Determine: **(05)**
i) Whether flow is possible
ii) Whether flow is rotational or irrotational
iii) The potential function ϕ and
iv) Acceleration components at (1, 1)
- c)** What is difference between static and dynamic seal, names any four types of materials used for seal? **(04)**
- Q.2 a)** A vertical cylinder of 15cm diameter is rotating at 100 rpm in another cylinder of diameter 15.1 cm concentrically. The space between the cylinders is filled with an oil if the torque require to rotate the cylinder is 9.5 Nm. Find the viscosity of the oil used. Take height of both cylinders = 20cm. **(07)**
- b)** A vertical isosceles triangular gate with its vertex up has a base width 2m and a height of 1.5m. If the vertex of the gate is 1m below the free water surface, find the total pressure force and the position of the centre of pressure. **(06)**
- Q.3 a)** In a two dimensional incompressible steady flow, stream lines are drawn so that they are 10 mm apart (location 'A') and velocity at that location is 5.0 m/s what is the velocity is the same field where the stream lines are 8 mm apart? (Location B) if pressure at A is 200 KPa. Find out the pressure at B. Assume the density of the fluid as 900 kg/ m³. **(07)**
- b)** Find out the discharge through a Venturimeter with inlet diameter of 10 cm ad throat diameter of 5cm, carrying oil of specific gravity 0.8. When the deflection of oil mercury manometer is 30cm. Assume coefficient of the meter as 0.95. **(06)**
- Q.4 a)** What are the important advantages of fluid power and remedies? **(05)**
- b)** Draw symbolic representation of the following: **(02)**
3 Position, 4 Way spring centered operated D.C.V.
- c)** A vane pump has a rotor diameter of 50 mm a cam ring diameter of 75 mm of a vane width of 50 mm. The eccentricity is 8 mm. Calculate the volumetric efficacy if the pump has an actual flow of 110 lpm at 1500 rpm and rated pressure. **(06)**

P. T. O.

SECTION-II

- Q.5** a) Classify accumulators used in hydraulic systems. (05)
- b) What are the different applications of hydraulic and pneumatics in machine tools. (05)
- c) Draw pneumatic meter out circuit using 4/2 direction control valve, what is the use of this circuit. (04)
- Q.6** a) What is a sequence valve? What is its purpose? Explain counter balance valve. Name one application of counter balance valve. (07)
- b) Write classification of flow control valve. Explain 4/2 solenoid operated D.C.V. (06)
- Q.7** a) What are the types of pneumatic actuators? Sketch a typical air motor and explain its working. What are the typical applications of these motors? (07)
- b) Following data reference to compressors (06)
- i) Delivery of air $10 \text{ m}^3/\text{min}$ at 7 bar
 - ii) Systems average demand of air = $7 \text{ m}^3/\text{min}$
 - iii) Allowed fluctuation of delivery pressure from 7 to 6 bar.
 - iv) Receiver capacity 4 m^3
- Determine total time the compressor is working per hour.
- Q.8** a) Classify Accumulators used in hydraulic systems. (04)
- b) Name the different parts and explain construction, working of the circuit as shown in fig. 1. (09)



* * * *