Questions

Q1. In a hydraulic system, motor converts fluid power into a rotary mechanical output. The output torque from the motor is 90 N-m at 225 rpm. The required flow rate is 30 L /min and the motor displacement is 0.105 L / rev and the overall motor efficiency is 7.5 percent. Calculate the volumetric efficiency and required pressure drop across the motor [GATE 1998]

Q2. In an hydraulic system, motor converts fluid power into a rotary mechanical output. The output torque from the motor is 1255 N-m at 600 rpm. The pressure drop across the motor is 150 bar. The torque and volumetric efficiency are both 0.9. Calculate (a) Motor Displacement (b) the flow required in the motor [GATE 1999]

Q3. In an open loop hydraulic system, a pump is running at 1440 rev / min is used to supply fluid to a motor. The motor displacement is .0005 m3 /rev .and it is to run 64 rpm. The pressure drop across the motor is 132 bar and pressure drop across between the motor and the pump is 5 bar . The torque and volumetric efficiency of both the pump and motor 0.95 and 0.9 respectively. Calculate (a) Toque required at the motor (b) the input power to operate the pump [GATE 2004]

Q4. A piston with 50 mm diameter and length 50 mm is to be moved at a velocity of 0.25 m s- lin a hydraulic cylinder with 50.2 mm diameter. The cylinder is full of oil with a kinematic viscosity of 9x10-4 m2 sI and a density of 880 kg m-3. Assuming pressure difference between inside and outside of the cylinder as zero, the force required to move the piston is
(A) 7.772 N (B) 15.543 N (C) 76.243 N (D) 152.476 N [GATE 2007]

Q5. A double acting single cylinder reciprocating pump has a cylinder diameter of 150 mm and stroke 300 mm. Suction and delivery heads for the pump are 3 and 30 m respectively. If the pump delivers 0.01033 m3 s-1 of water at 60 rpm, the percentage slip is [GATE 2008]

(A) 97.43 (B) 1.57 (C) 2.57 (D) 0.0257

Q6. A double acting hydraulic cylinder has a rod diameter equal to one-half the piston diameter. If the system pressure is maintained constant, the ratio of load carrying capacity of extension stroke to that of retraction stroke is [GATE 2013]

(A) 0.75 (B) 1.00 (C) 1.33 (D) 4.00

Q7. A hydraulic circuit uses a pump having a fixed displacement volume of 12.5 cm3 rev -1 driven at 1500 rpm. The pump has a volumetric efficiency of 85% and an overall efficiency of 75%. If the system pressure is set at 15 MPa by the relief valve, the power required to drive the pump in kW will be [GATE 2014]
(A) 2.99 (B) 4.53 (C) 5.31 (D) 7.53

Q8. A double acting hydraulic cylinder has a bore of 200 mm with a piston rod of 140 mm diameter. The extend speed of the piston is 80 mm s-1. If the flow rate of oil during retraction is same as that of the extending, the retract speed of the piston in mm s-1 is ___[GATE 2015]

Q9. A gear pump discharges 100 L min-1 against a system pressure of 15 MPa. The overall efficiency of the pump is 0.75. Input power to run the pump in kW is _____[GATE 2016]