29. a. i Explain the working of rotary direction control value. (4 Marks)

ii. With diagram explain the working principle of pressure compensated flow control value. (8 Marks)

(OR)

b.i. With circuit explain the operation of electro hydraulic servo system. (8 Marks)

ii. Discuss the difference between servo and proportional values. (4 Marks)

30. a. What are fluid conditioners? Explain air line filter and lubricator. Draw the symbol.

(OR)

b.i. Explain the need of fluid sensor. (2 Marks)

ii. Explain the operation of cone jet proximity sensor. (4 Marks)

iii. Explain the operation of AND/ NAND fluidic device with truth table. (6 Marks)

31. a. Design a circuit to generate the cycle $B^{-}D^{+}D^{-}C^{-}B^{+}C^{+}$. Explain neatly the procedure to be followed:
'B, D and C' indicate cylinders and
'+' means extension of cylinders and
'–' means retraction of cylinder

(OR)

b. A double acting cylinder is controlled by a 4/3 DCV which holds the regenerative neutral. The pressure relief regenerative neutral. The pressure relief value is set at 9 N/mm^2. Piston area is 175 cm^2 and rod are is 60cm^2. If pump flow is 20 gallons/ min [1 gallon = 3.785 (liters)], find the cylinder speed, load carrying capacities for various positions of the DCU.

32. a. Explain with suitable circuit how in an industry
(i) Production of cylinder from free falling be achieved.
(ii) Safety of operator by suing two handed push button.

(OR)

b.i List out the probable cause for overheating hydraulic fluid, actuator fails to move and noisy. (9 Marks)

ii. Discuss the steps to be taken to eliminate pump cavitation. (3 Marks)

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Reg. No.															

B.Tech. DEGREE EXAMINATION, DECEMBER 2016
Fifth Semester

ME1025 – FLUID POWER CONTROL
(For the candidates admitted during the academic year 2013 – 2014 and 2014 -2015)

Note:
(i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

1. Slip of a reciprocating pump is defined as the
(A) Sum of actual discharge and the theoretical discharge
(B) Ratio of actual discharge to the theoretical discharge
(C) Product of theoretical and actual discharge
(D) Difference of theoretical discharge and the actual discharge

2. A hydraulic coupling belongs to the category of
(A) Energy transfer machines
(B) Power developing machines
(C) Power absorbing machines
(D) Energy generating machines

3. In order to avoid cavitation in centrifugal pumps
(A) The suction pressure should be low
(B) The delivery pressure should be high
(C) The suction pressure should be high
(D) The delivery pressure should be low

4. The working of which of the following hydraulic units is based on Pascal's law?
(A) Hydraulic coupling
(B) Hydraulic press
(C) Jet pump
(D) Air lift pump

5. Which energy is used to transmit power in hydrostatic system?
(A) Pressure energy
(B) Kinetic energy
(C) Potential energy
(D) Dynamic energy

6. For which of the following purpose hydraulic film acts as a seal between the machined cavity and spool
(A) To reduce leakage
(B) For cooling purpose
(C) For lubrication purpose
(D) To improve surface finish

7. What is the relation between temperature and viscosity for hydraulic oil?
(A) Temperature and viscosity vary linearly
(B) As temperature decreases viscosity decreases at atmospheric pressure
(C) As temperature increases viscosity decreases at atmospheric pressure
(D) No relation with temperature and viscosity

8. Pressure applied on a fluid in a container is equally distributed in all directions and acts with
   (A) Equal force on equal areas parallely
   (B) Equal force on different areas and at right angle
   (C) Equal force on equal areas and at right angle
   (D) Equal force on different areas and at right angle

9. Which value is also known as memory value?
   (A) Singe pilot signal value
   (B) Double pilot signal value
   (C) Roller lever value
   (D) Logic value

10. Calculate area of pipe if, flow rate is 20L/min and flow velocity is 5cm/s.
   (A) 66.66 cm^2
   (B) 60 cm^2
   (C) 62 cm^2
   (D) 59.8 cm^2

11. What is a pressure sequence value
   (A) It is a combination of adjustable pressure relief value and directional control value
   (B) It is a combination of non adjustable pressure relief value and direction control value
   (C) It is a combination of adjustable pressure reducing value and check value
   (D) It is a combination of adjustable pressure reducing value and flow control value

12. In electropneumatic circuits
   (A) Spool is shifted by signal air
   (B) Spool is shifted by control air
   (C) Spool shifted by electromotive force
   (D) Spool is not moved

13. Motors used in high speed applications have
   (A) High torque with high speed
   (B) Low torque with high speed
   (C) High torque with low speed
   (D) Low torque with low speed

14. CAM lobe hydraulic motor is a type of
   (A) Axial hydraulic motor
   (B) Orbit hydraulic motor
   (C) Gear hydraulic motor
   (D) Radial hydraulic motor

15. When is a pressure reducing value used?
   (A) It is used when higher pressure than system pressure is required
   (B) It is used when lower pressure than system pressure is required
   (C) When absolutely zero pressure is required
   (D) It is used when same pressure is required

16. What causes reduction in speed of the piston rod when hydraulic cylinder is cushioned?
   (A) Oil flow through small space
   (B) Back pressure created in the system
   (C) Both (A) and (B)
   (D) Only (A)

17. Which of the following statements is true for standard hydraulic cylinder and a telescopic cylinder
   (A) Telescopic and standard cylinders give same stroke length
   (B) Telescopic cylinders give greater stroke length than standard cylinder
   (C) Telescopic cylinders give lesser stroke length than standard cylinder
   (D) Telescopic and standard cylinders has no relation with respect to stroke length

18. How is pressure of fluid under piston calculate din a weighted accumulator?
   (A) Weight added/ piston area
   (B) Piston area/ weight added
   (C) Weight added/ piston force
   (D) Piston force/ weight added

19. Which of the following statements is true. For two pumps used in circuit when initially fast operation is performed to reach a job and reading operation is done at a slow speed.
   (A) Initially to reach job, a tool must be connected to a pump of high discharge and low pressure
   (B) Initially to reach a job, a tool must be connected to a pump required
   (C) For feeding operating low discharge low pump is required
   (D) For feeding operation high discharge high pressure pump is required

20. Which of the following gas is used in gas charged accumulator?
   (A) Oxygen
   (B) Nitrogen
   (C) Carbon dioxide
   (D) Carbon monoxide

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

21. Discuss the primary function of hydraulic fluid and appreciate the properties of hydraulic fluid.

22.i. What is the pump how rate required to drive the cylinder through its stroke is a specified time?

ii. Device a suitable circuit to operate single actuating cylinder.

23. Differentiate pressure reducing value and pressure relief value.

24. Bring out the significance of pressure override in selecting pressure relief value.

25. Determine operating speed and load carrying capacities of regenerative cylinder.

26. Explain the basic design features of reservoirs and determine the proper reservoirs size for given hydraulic system.

27. State the difference between a filter and strainer. Discuss the types of filtering methods.

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

28. a. With neat sketch explain the construction, working principle of in-line piston pump. With diagram justify how the variable displacement of pump is achieved.

(OR)

b.i. Explain with neat diagram the operation of radial piston pump. (6 Marks)

ii. A pump has displacement volume of 100 cm^3. It delivers 0.0015 m^3/s at 1000 rpm and 70 bar. If the prime mover input torque is 120N.m.
   (i) What is the overall efficiency of the pump? (4 Marks)
   (ii) What is the theoretical torque required to operate the pump? (2 Marks)