

USN

--	--	--	--	--	--	--	--	--	--	--	--	--

15ME71

Seventh Semester B.E. Degree Examination, June/July 2019
Energy Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat sketch, explain the travelling gate stokers. (08 Marks)
b. Mention the various types of draught system, used at chimneys and explain them with a neat sketch (any one). (08 Marks)

OR

- 2 a. What are the function of super heaters and economizers? (04 Marks)
b. List the different types of fuels used in steam generation. (04 Marks)
c. Estimate the height of the chimney required to produce a static draught of 16 mm of water if the mean temperature of the flue gas in the chimney is 255°C and the temperature of outside air is 25°C. The densities of atmospheric air and flue gas at N.T.P are 1.293 and 1.34 kg/m³ respectively. (08 Marks)

Module-2

- 3 a. Explain different methods of starting a diesel engine. (06 Marks)
b. Draw a line diagram to show the layout of diesel power plant and describe in brief. (10 Marks)

OR

- 4 a. With a neat sketch explain the pumped storage plant. (06 Marks)
b. The discharge through monsoon stream as tabulated below:

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Discharge(m ³ /s)	2.0	1.5	1.0	0.6	0.0	0.0	8.0	10.0	12.0	6.0	4.0	3.0

- i) Draw the hydrograph and calculate the average flow.
ii) Determine the capacity of reservoir for the obtained average flow if a dam is constructed across the stream.
iii) If the mean level of water on the upstream side is 100 m above the tail races find the power in kW that could be generated assuming 80% generator efficiency. (10 Marks)

Module-3

- 5 a. Sketch and explain the solar flat plate collector. (08 Marks)
b. Name solar radiation measuring instruments, and explain any one with neat sketch. (08 Marks)

OR

- 6 a. Give the classification of solar cells, and explain the working principle of solar cell. (08 Marks)
b. Calculate the angle made by the beam radiation with normal to a flat plate collector December 21 at 0900h (LAT). The collector is located at in New Delhi (28°35'N, 77°12'E) and is fitted at an angle of 36° with the horizontal and is pointing due south. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Give a brief note on horizontal and vertical axis wind mill system. (08 Marks)
b. Wind blows with a velocity of 16 m/s at 15°C. The turbine diameter is 115 m with rotating speed of 40 rpm at maximum efficiency. Assume one standard atmospheric pressure and propeller wind turbine. Calculate the following:
i) Total power density in the wind stream
ii) Maximum obtainable power density
iii) Reasonably obtainable power density
iv) Total power (08 Marks)

OR

- 8 a. Draw a neat sketch and explain the working of double basin tidal power plant. (08 Marks)
b. What are the advantages and disadvantages of tidal power plant? (08 Marks)

Module-5

- 9 a. What are the stages in anaerobic digestion process? Explain. (08 Marks)
b. With a neat sketch, explain the updraft gasifier. Mention the temperature ranges. (08 Marks)

OR

- 10 a. Write short notes on the following:
i) Fuel cell thermodynamics principles (08 Marks)
ii) Nuclear energy applications (08 Marks)
b. With a neat sketch, explain the closed cycle OTEC system (Anderson cycle). (08 Marks)

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

15ME72

Seventh Semester B.E. Degree Examination, June/July 2019 Fluid Power Systems

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Sketch and explain the structure of hydraulic control system. (10 Marks)
b. State Pascal's law? Explain the significance of Pascal's law in applying fluid power. (06 Marks)

OR

- 2 a. What is the importance of seals in hydraulic system? list the functions of seals? (08 Marks)
b. What are the desirable properties of fluids in hydraulic system? (08 Marks)

Module-2

- 3 a. What are the important considerations taken while selecting a pump for particular applications? Explain procedure. (06 Marks)
b. A pump having displacement of 14cm^3 is driven at 1440rpm and operates against a maximum pressure of 150bar. The volumetric efficiency is 0.9 and the overall efficiency is 0.80. Find :
i) Pump delivery in LPM
ii) The input power required in kW
iii) The Torque at the pump shaft (10 Marks)

OR

- 4 a. What is an actuator? How are they classified? Explain each one of them briefly. (08 Marks)
b. A double acting cylinder with a single rod (differential cylinder) has to produce a thrust and 100kN at a speed of 0.4 cms/sec during extension. The operating pressure is 120 bar. Calculate the diameter of the cylinder and flow rate. If the cylinder has a piston rod of 20mm diameters. What would be the force and speed during retraction for the same operating pressure and discharge? (08 Marks)

Module-3

- 5 a. Explain briefly the construction, working principle along with graphic symbol of the following: i) Sequencing valve ii) Counter balance valve. (10 Marks)
b. Explain with a neat sketch, the principle of working of a pilot operated pressure relief valve. Also draw the graphic symbol for the valve. (06 Marks)

OR

- 6 a. Explain briefly with a neat sketch, the cylinder synchronizing circuit operated together with a pair of cylinders in series in a synchronized manner to lift the load? (08 Marks)
b. Describe i) Meter – in circuit ii) Meter out circuit for controlling the speed of cylinder? List their merits and limitations? (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. List the advantages and limitations of Pneumatic system. (08 Marks)
b. Explain with a neat sketch 3/2 way spool type dc valve to control flow of air in pneumatic system. (08 Marks)

OR

- 8 a. Differentiate between hydraulic and pneumatic system. (06 Marks)
b. Explain the following with a neat sketches.
i) Magnetic type rodless cylinder
ii) Cable operated rodless cylinder. (10 Marks)

Module-5

- 9 a. Using two-way, two-position DCV, show how the following logic-functions can be achieved in pneumatics? i) AND ii) OR (08 Marks)
b. Explain direct and indirect actuation of pneumatic cylinder. (08 Marks)

OR

- 10 a. Explain the principle of cascade control system. (08 Marks)
b. What are Sensors? How many types of sensors are used in electro-pneumatic systems? (08 Marks)

* * * * *

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

15ME742

Seventh Semester B.E. Degree Examination, June/July 2019

Tribology

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define the term Tribology. Discuss industrial importance of tribology. (06 Marks)
b. Discuss major properties of an ideal lubricant. (10 Marks)

OR

- 2 a. Define Viscosity. State and explain Newton's law of viscosity, with a neat sketch. (06 Marks)
b. Explain Construction and Operating principle of Falling Sphere Viscometer and Flower's Viscometer, with neat sketches. (10 Marks)

Module-2

- 3 a. Define the term friction. Explain measurement of friction by an inclined plane test rig. (08 Marks)
b. Explain Bowden and Tabor's Adhesion theory of friction. (08 Marks)

OR

- 4 a. Define the term Wear. Explain in brief classification of wear in relation to wear mechanism. (08 Marks)
b. Explain Delamination theory of wear in brief. (08 Marks)

Module-3

- 5 Derive the Reynold's equation in two dimensions. (16 Marks)

OR

- 6 a. A full journal bearing has an equal length and diameter of 0.05m. The diametral clearance ratio is 0.001 and the operating viscosity of the lubricant is 0.05 par sec. If the journal speed is 950 rpm and if the bearing sustains a load of 100kN, determine eccentricity ratio and thickness of the lubricant. (08 Marks)
b. A full journal bearing operates under a load of 1.75 kN at a speed of 900 rpm. The diameter of journal is 37.5mm and the length of bearing is 46.8mm. The minimum oil film thickness must not be less than 0.009375mm. Assume diametral clearance ratio to be 0.001 and average operating temperature as 95°C. Determine the type of lubricant and power loss in the bearing by considering end leakages into account. (08 Marks)

Module-4

- 7 a. Derive an equation for load carrying capacity of an idealized plane slider bearing with pivoted shoe. (08 Marks)
b. A square shape pivoted shoe slider bearing has the following specifications. Load carrying capacity = 13344 N , Velocity of moving member = 5.08 m/s , Viscosity of oil used = 15Cp. Permissible minimum oil film thickness = 0.01905mm. Assume $q = 1.2$ and determine coefficient of friction and power loss. Neglect effect of end flow from the bearing. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Derive an equation for rate of flow of oil through a hydro static step bearing. (08 Marks)
b. A hydro static step bearing has the following specifications. Journal diameter = 100mm , Diameter of pocket = 50mm , Vertical thrust on bearing = 18.16 kN , External pressure = 1.013 bar , Journal speed = 60 rpm , Desirable oil film thickness = 0.1mm , Viscosity of lubricant = 8.5 Cp. Determine energy lost in pumping and coefficient of friction. (08 Marks)

Module-5

- 9 a. Explain major properties of typical bearing materials. (08 Marks)
b. Explain principal methods of physical vapour deposition in surface coating with a neat sketch. (08 Marks)

OR

- 10 a. Explain the basic requirements to be satisfied by any component for selection of a particular surface coating. (06 Marks)
b. Explain in brief any five common surface hardening processes. (10 Marks)

* * * * *

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

15ME753

Seventh Semester B.E. Degree Examination, June/July 2019 Mechatronics

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define mechatronics. Explain about multidisciplinary scenario. (10 Marks)
b. List advantages, limitations and applications of mechatronics. (06 Marks)

OR

- 2 a. Sketch and explain hall effect sensor. (06 Marks)
b. Define sensor and transducer. Give the classification of transducers. (10 Marks)

Module-2

- 3 a. Define microprocessor. Explain organization of microprocessor based control system. (10 Marks)
b. List the differences between microprocessor and microcontroller. (06 Marks)

OR

- 4 Sketch and explain Intel's 8085A microprocessor architecture. (16 Marks)

Module-3

- 5 a. Sketch and explain basic structure of Programmable Logic Controller (PLC). (12 Marks)
b. Explain the basic standard symbols used in ladder diagram for programming PLC. (04 Marks)

OR

- 6 a. Write short notes on: (i) Advanced actuators (ii) Pneumatic actuators (06 Marks)
b. Explain different parts of a robot. (10 Marks)

Module-4

- 7 a. Explain the following mechanisms with neat sketch:
i) Cam and cam follower ii) Gear trains iii) Ratchet and Pawl (12 Marks)
b. What are the mechanical aspects of motor selection? Explain in brief. (04 Marks)

OR

- 8 a. Sketch and explain the working principle of relays with suitable application. (08 Marks)
b. Explain the working principle of DC motor. Give the classification of DC motors. (08 Marks)

Module-5

- 9 a. Sketch and explain: (i) Spool valve (ii) Poppet valve. (08 Marks)
b. Explain different ways of valve actuation with their symbols. (08 Marks)

OR

- 10 a. With neat sketch, explain various components of a hydraulic system. (08 Marks)
b. Sketch and explain (i) check valve (ii) needle valve. (08 Marks)

* * * * *

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.