

FLUID MECHANICS AND HYDRAULIC MACHINES

(ELECTRAL & ELECTRONICS ENGINEERING)

Time: 3 Hours

Max. Marks: 70

PART – A

Answer all questions

[1 x 10 = 10M]

1. a) Define Specific gravity?
b) What is the function of manometer?
c) Define Streak lines?
d) What is momentum equation?
e) What is hydraulic gradient line?
f) What is the function of Pitot tube?
g) What is water hammer?
h) What is the example of high head low discharge turbine?
i) What is the NPSH?
j) What is coefficient of discharge of a pump?

PART - B

Answer one question from each Unit

[5 x 12 = 60M]

UNIT – I

2. A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left limb from the centre of the pipe is 15 cm below

(OR)

3. If a certain liquid has viscosity $5 \times 10^{-4} \text{ kg}_f \text{ sec/m}^2$ and kinematic viscosity 3.503×10^{-2} stokes, what is the specific gravity.

UNIT – II

4. Derive Euler's equation of motion.

(OR)

5. Velocity potential for a 2-D flow is given by $\phi = c(x^2 - y^2)$. Determine the corresponding stream function, what will be the velocity of flow at the point (2, 1) in the flow field?

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SET-2

UNIT- III

6. Define Reynolds's number and discuss the working principle of Turbine flow meter.

(OR)

7. Water is supplied by means of a 60 cm diameter pipe, to a power plant and the head loss due to friction is 27 m. In order to reduce the power consumption, it is proposed to lay another main of appropriate diameter alongside of existing one so that both pipes work in parallel for the entire length and reduce the head loss to 9.6 m. Find the diameter of new pipe which has same value of f and are same length.

UNIT – IV

8. What is the difference between Impulse and Reaction turbines? And Discuss why draft tube is required for reaction turbine?

(OR)

9. Define unit quantities and Specific quantities. Discuss the working principle of Governing of hydraulic turbines?

UNIT – V

10. Explain the working principle of single stage single acting reciprocating pump.

(OR)

11. A multistage centrifugal pump is discharging 45,000 lit/min against a manometric head of 60 m. There are four impellers, keyed to the same shaft which is running at 350 rpm. The vanes are curved back at an angle of 60° to the outer periphery. The velocity of flow is 0.27 times the corresponding peripheral velocity and hydraulic losses in the pump are $1/3$ the velocity head at exit of the pump. Determine diameter of the impeller and manometric efficiency.

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SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December, 2015

ELECTRICAL TECHNOLOGY
(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 70

PART – A

Answer all questions

[1 x 10 = 10M]

1. Answer the following.
 - a) How Hysteresis losses can be minimized?
 - b) What are the disadvantages of Swinburne's Test?
 - c) Why Transformers are rated in kVA?
 - d) Define Voltage Regulation of Transformer?
 - e) Draw Energy flow diagram of Induction Motor.
 - f) What is Eddy current loss?
 - g) Define winding factor.
 - h) What are the types of Synchronous machine based on their construction features?
 - i) Permanent Magnet Moving Coil type of instrument works on which principle.
 - j) List out any two of the applications of Moving iron type of Instrument

PART – B

Answer one question from each Unit

[5 x 12 = 60M]

UNIT – I

2.
 - a). Explain the Construction and operating principle of DC Generator. [6M]
 - b). A 4 pole lap wound D. C. shunt generator has a useful flux per pole of 0.07 wb. The armature winding consists of 220-turns each of 0.004 ohms resistance. Calculate the terminal voltage when running at 900 rpm if the armature current is 50A. [6M]

(OR)

3.
 - a) How can you conduct Swinburne's test. Write the advantages and disadvantages of the above test. [6M]
 - b). A 220V D.C shunt motor has armature resistance of 0.25Ω on load, it takes an armature current of 50A and runs at 1500 r.p.m. If the flux of motor is reduced by 10% without changing the load torque, find the new speed of the motor. [6M]

UNIT – II

4. A 230/1100V, 50Hz single phase transformer give the following test results:
O.C. Test (LV Side): 230V, 0.7A, 75W
S.C. Test (HV Side): 20V, 10A, 100W
Calculate the voltage regulation at 0.9 pf and parameters of the equivalent circuit referred to the LV Side. [12M]

(OR)

5. a). Draw and explain the phasor diagram of a single phase transformer operating with lagging and leading Loads. [8M]
b). Discuss about losses and efficiency of a transformer. [4M]

UNIT – III

6. a). Derive the condition for maximum starting torque and running torque of 3Φ induction motor and also draw Torque-slip characteristics. [8M]
b). A $3-\Phi$, 6 pole, 50Hz cage motor is running with a slip of 4%. Find
(i) Speed of rotating field relative to stator winding
(ii) Motor speed [4M]

(OR)

7. Explain briefly various starting method of a three phase induction motor. [12M]

UNIT – IV

8. a) Derive the expression for distribution factor of an alternator. [4M]
b) A 120 kVA, 415V, three phase star connected alternator has the following parameters:
Armature Resistance = 0.5Ω
Synchronous reactance = 10Ω
Calculate the percentage voltage regulation at full load at 0.8 p.f lagging and leading [8M]

(OR)

9. A 3-phase, 8-pole star connected alternator has the following data:
Number of slots=192; Conductors/slot =8 (conductors of each phase are connected in series); the coil span=160 electrical degrees; the speed of the alternator =375 r. p. m; flux / pole=55 mWb. Calculate the phase and line voltages. [12M]

UNIT – V

10. What are types of MI type of Instruments? Describe the constructional details and working of an attraction type MI instruments. Derive its torque equation. [12M]

(OR)

11. a). Explain the principle of operation of Moving Iron instruments. [6M]
b). What are the basic requirements of indicating type of instruments? Briefly discuss them. [6M]