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Code: 5G539

II B.Tech. I Semester Supplementary Examinations May/June 2022

Fluid Mechanics and Hydraulic Machines

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

1. a) Define the following. 6M
- i) Absolute pressure ii) Gauge pressure iii) Vacuum pressure
- b) The right limb of a simple U-tube manometer containing mercury is open to atmosphere while the left limb is connected to a pipe in which a fluid of sp.gr.0.9 is flowing. The center of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of a fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. 8M

OR

2. Water flows through a pipe AB 1.2 m diameter at 3m/sec and then passes through a pipe BC 1.5 m diameter. At C the pipe branches. Branch CD is 0.8 m in diameter and carries one third of flow in AB. The flow velocity in branch CE is 2.5 m/sec. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE. 14M

UNIT-II

3. Derive an expression for rate of flow through venturimeter. 14M

OR

4. A 45° reducing bend is connected in a pipe line, the diameters at inlet and outlet of the bend being 600 mm and 300 mm respectively. Find the force exerted by the on the bend if the intensity of pressure at inlet to the bend is 8.829 N/cm² and the rate of flow of water is 600 litres per second. 14M

UNIT-III

5. What are the various types of hydroelectric power stations and explain briefly about them. 14M

OR

6. Derive an expression for force exerted by a jet on a stationary curved plate when i) when the jet strikes the curved plate at the center ii) jet strikes the unsymmetrical curved plate at one end tangentially . 14M

UNIT-IV

7. Explain the characteristic curves of the hydraulic turbines 14M

OR

8. a) Define specific speed of the turbine and derive an expression for it. 7M
- b) A turbine is to operate under a head of 25 m at 200 r.p.m. The discharge is 9 cumec. If the efficiency is 90%, determine: i) specific speed of the machine ii) power generated iii) type of turbine. 7M

UNIT-V

9. Explain about the various losses in the centrifugal pumps. 14M

OR

10. The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 r.p.m. The vane angle of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of the water. 14M

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R-15

Code: 5G234

II B.Tech. I Semester Supplementary Examinations May / June 2022

Electro Magnetic Fields

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

- 1. a) State and explain vector form of Coulombs law? 4M
- b) Derive the expression for Electric Field intensity and potential at a point P which is situated h meter away from the disc along its axis. The disc is charged uniformly with a charge density of ρ_s C/m². 10M

OR

- 2. Given $D = (2y^2+z)a_x + 4xy a_y + x a_z$ C/m² find 14M

UNIT-II

- 3. State and explain the continuity equation of current in integral form and point form. 14M

OR

- 4. a) Deduce the boundary conditions for dielectric to dielectric with tangential and normal component? 7M
- b) Derive the equation for capacitance of two parallel transmission lines. 7M

UNIT-III

- 5. a) Derive and explain the relationship between Magnetic flux, magnetic Field Intensity and Magnetic Flux density. 7M
- b) Describe the few applications of Ampere's circuital law? 7M

OR

- 6. A current element $I \, dl = 2 \, (0.6a_x - 0.8a_y)$ micro amperes is situated at a point (4,-2,3). Find the incremental field H at a point (1,3,2). 14M

UNIT-IV

- 7. a) Derive the expression for energy stored in a magnetic field. 7M
- b) Derive the self-inductance of a solenoid 7M

OR

- 8. Derive the expression for force between two long parallel current carrying conductors placed in a magnetic field. 14M

UNIT-V

- 9. a) Distinguish clearly the dynamically induced EMF and statically induced EMF explain with neat diagram. 7M
- b) Find the EMF developed around a circular path with radius $r=0.5$ m in the plane $z=0$ at $t=0$ if (i) $B=0.1 \sin(377t)a_z$, (ii) $B=0.1 \sin(377t/r)a_r$. 7M

OR

- 10. Find the displacement current density if the magnetic field intensity in free space is given as $H=H_0 \sin a_y$ A/m, where $\omega = t - \beta z$ and β is a constant quantity. Determine the displacement current density. 14M
