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**R-15**

**Code: 5G234**

II B.Tech. I Semester Supplementary Examinations November 2023

**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 )

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**UNIT-I**

- 1. a) State and explain Gauss law in Integral form. 7M
- b) Derive the expression for energy density in an electrostatic field. 7M

**OR**

- 2. a) Derive and explain Maxwell's second equation? 7M
- b) Define Potential and Potential difference? 7M

**UNIT-II**

- 3. a) Explain Polarization of dielectric materials? 7M
- b) Give the expression for capacitance of a coaxial cable with two dielectrics? 7M

**OR**

- 4. a) Derive Laplace Equation from fundamentals. 8M
- b) State the properties of Dielectric materials 6M

**UNIT-III**

- 5. a) Derive the expression for Vector Magnetic Potential. 7M
- b) Derive and explain the relationship between Magnetic flux, magnetic Field Intensity and Magnetic Flux density. 7M

**OR**

- 6. a) A solenoid has 3000 turns, a length of  $l=150$  cm, a radius of  $a= 2$  cm and carries a current of 100 mA. Find H at (0,0,20) cm and (0,0,150) cm. 7M
- b) State and explain Amperes circuital law. 7M

**UNIT-IV**

- 7. a) Derive the expression for inductance of a solenoid using Amperes circuital law. 6M
- b) Derive the expression for force on a straight current carrying conductor placed in a magnetic field 8M

**OR**

- 8. a) A current strip 2 cm wide carries a current of 15 A in the  $a_z$  direction. Find the force on the strip of unit length if the uniform field is  $B= 0.20a_z$  Tesla. 7M
- b) Derive the self-inductance of a solenoid 7M

**UNIT-V**

- 9. a) Derive the equation for modified Amperes circuital law for time varying fields. 7M
- b) Distinguish between Conduction Convection and Displacement Currents. 7M

**OR**

- 10. Compare and Contrast Electric and Magnetic Fields? 14M

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Hall Ticket Number :

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**R-15**

**Code: 5G539**

II B.Tech. I Semester Supplementary Examinations November 2023

**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 )

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**UNIT-I**

1. a) Define the following, Marks
- i) Steam Line ii) Streak Line iii) stream Tube 6M
  - b) Calculate the Density, Specific weight and Specific gravity of One liter of liquid, which weighs 7N. 8M

**OR**

2. a) Explain the property viscosity of a fluid. Also describe its variation with temperature. 7M
- b) The diameters of a pipe at sections 1 and 2 are 10cm and 15cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/sec. Determine also the velocity at section 2. 7M

**UNIT-II**

3. a) Explain the TEL and HGL with neat sketch. 7M
- b) Explain the minor losses in pipes briefly. 7M

**OR**

4. a) Derive an expression for rate of flow through venturimeter. 7M
- b) At a sudden enlargement of water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. 7M

**UNIT-III**

5. a) What is pumped storage power plant and explain its concept. 7M
- b) Derive an expression for force exerted by the jet on the flat vertical plate moving in the direction of the jet. 7M

**OR**

6. a) Describe the various storage requirements of hydroelectric power station. 7M
- b) Derive the expression for a force exerted by jet of water on a stationary inclined plate. 7M

**UNIT-IV**

7. a) Explain the classification of turbines. 7M
- b) Define the unit quantities and describe them with expressions 7M

**OR**

8. a) Explain the Draft tube theory and list out its functions. 8M
- b) A water turbine has a velocity of 6 m/sec at the entrance to the draft tube and velocity of 1.2 m/sec at the exit. For friction losses of 0.1m and tail water 5m below the entrance to the draft tube, find the pressure head at the entrance. 6M

**UNIT-V**

9. a) Explain about the various losses in the centrifugal pumps. 7M
- b) Derive an expression for the work done by the impellor of a centrifugal pump. 7M

**OR**

10. a) Explain the working of double acting reciprocating pump with neat sketch. 7M
- b) Describe the meaning of NPSH and derive an expression for it. 7M

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Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 32+8=40, will be treated as malpractice.