AR13   **SET 02**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March 2015
FLUID MECHANICS
(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1. a) State Pascal's law

   b) What do you understand by Hydrostatic law?

   c) What is Center of pressure?

   d) What is streak line?

   e) Distinguish between rotational flow and ir-rotational flow.

   f) What is velocity potential function?

   g) What is Laminar flow?

   h) How are notches and weirs classified?

   i) State Chezy's equation giving the details of notation used.

   j) What is Hydraulic gradient line?

PART-B

Answer one question from each unit **[5X12=60M]**

UNIT-I

2. a) Define the following
   - I.   Absolute pressure
   - II.   Gauge pressure
   - III.   Vacuum pressure
   - IV.   Atmospheric pressure   [12 M]

   b) A single column manometer is connected to a pipe containing a liquid of specific gravity 0.9 as shown in fig. Find the pressure in the pipe if the area of the reservoir is 100 times the area of the tube for the manometer reading shown in fig. The specific gravity of mercury is 13.6.
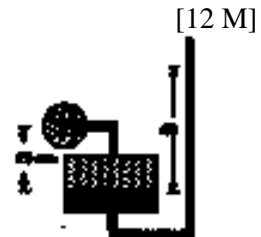
. **(OR)**

3.a) Explain briefly the following
   - I.   Piezometer
   - II.   U-tube manometer

   b) A differential manometer is connected at the two points *A* and *B* of two pipes as shown in fig. The pipe *A* contains a liquid of specific gravity 1.5, while pipe *B* contains a liquid of specific gravity 0.9. The pressures at *A* and *B* are 1 kgf/cm^2 and 1.80 kgf/cm^2 respectively. Find the difference in mercury level in the differential manometer.
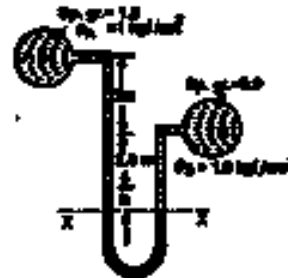
UNIT-II

4. a) Derive the expression for total pressure on an inclined immersed surface

   b) An isosceles triangular plate of base 5m and altitude 5m is vertically immersed in an oil of specific gravity 0.8. The base of the plate is 1m below the free water surface. Determine the total pressure and the center of pressure.

(OR)

5. a) Derive the expression for centre of pressure for a vertically immersed surface

   b) A circular plate diameter 2.5 m is placed vertically in water in such a way that the center of the plate is 3 m below the free surface of water. Determine the total pressure and the center of pressure.

UNIT-III

6.a) Define the terms (i) total acceleration, (ii) convective acceleration and (iii) local acceleration

   b) A 40 cm diameter pipe, conveying water, branches into two pipes of diameters 30 cm and 20 cm respectively. If the average velocity in the 40 cm diameter pipe is 3 m/s. Find the discharge in this pipe. Also determine the velocity in 20 cm pipe if the average velocity in 30 cm diameter pipe is 2 m/s.

(OR)

7.a) What do you mean by equipotential line and a line of constant stream function?

   b) The stream function, , is given by $= 2x - 5y$. Calculate velocity components in x and y direction. Also show that represents a possible case of fluid flow.

UNIT-IV

8.a) Analyze the Forces acting on a fluid in motion.

   b) Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the difference in datum head if the rate of flow through the pipe is 40 lit/s.

(OR)

9.a) State the momentum equation. How will you apply momentum equation for determining the force exerted by a flowing liquid on a pipe bend?

   b) A pump has a tapering pipe running full of water. The pipe is placed vertically with the diameters at the base and top being 1.2 m and 0.6 m respectively. The pressure at the upper end is 240 mm of Hg vacuum, while the pressure at the lower end is 15 kN/m^2. Assume the head loss to be 20 % of difference of velocity head. Calculate the discharge, the flow is vertically upward and difference of elevation is 3.9m.

UNIT-V

10 a) Derive an expression for discharge as liquids through a rectangular notch.

   b) A 120mm × 60mm venturimeter with $C_d = 0.98$ is to be replaced by an orifice meter having a value of $C_d = 0.6$, is both the meters are to give the same differential mercury monometer reading for a discharge of 100 lit/sec and the inlet diameter to remain 120 mm. What should be the diameter of orifice?

(OR)

11.a) Explain how the following flow problems are analyzed.

   i. Series pipe connection,
   ii. Parallel pipe connection,
   iii. Equivalent pipe connection.

b) Water flows through a 10cm diameter, 30m long pipe at a rate of 1400 rpm. What percent of head would be gained by replacing the central one third length of pipe by another pipe of 20cm diameter. Assume that the changes in section are abrupt and $f = 0.008$ for all pipes. Neglect entrance and exit losses but consider major loss and losses due to sudden contraction and sudden expansion.

CODE: 13EE2006
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March 2015
ELECTRO MAGNETIC FIELDS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Time: 3 Hours   **Max Marks: 70**
PART-A
Answer all questions: **[1 X 10 = 10M]**
1. (a) Define the term 'Electric intensity'.
   (b) State Gauss's law for electrostatics
   (c)   Explain dynamic emf.
   (d) Define relaxation time.
   (e) Find the capacitance of a parallel capacitor with two different dielectrics between the plates.
   (f) What is the relationship between **E** and V ?.
   (g) State Biot-savart law.
   (h) State the conditions at a boundary between two conducting surface.
   (i) What is the equation for point form of ohms law?
   (j) Give an example for conduction current

PART – B
Answer one question from each unit   **[5 x 12 = 60M]**

UNIT-I
2. a) State Coulomb's law and using Coulomb's find Electric field intensity due to Surface charge.
   b) If $V = x^2y^2z^2$ and $A = x^2y\,a_x + xz^3\,a_y - y^2z^2\,a_z$, find: (i) $\nabla^2 V$ (ii) $\nabla^2 A$, (iii) curl curl A.

(OR)
3. a) Verify that $\nabla \times (VA) = V(\nabla \times A) + \nabla V \times A$. Where, V and A are scalar and vector fields, respectively.
   b) Evaluate $\nabla \times (VA)$, when $V = \frac{1}{r^2}$ and $A = r\cos\theta\,a_r + r\sin\theta\,a_\theta + \sin\theta\cos\varphi\,a_\varphi$.

UNIT-II
4. a) State and explain dielectric-dielectric and conductor-dielectric boundary condition.
   b) Verify whether the potential fields given below satisfy Laplce's equation.
       i) $V=4x^2 - 6y^2 + 2z^2$ ii) $V= p\cos\emptyset +4z$

.   **(OR)**
5. a) Solve Laplace's equation by separation of variables in cylindrical co-ordinate systems
       (assuming there is no dependence on z - cylindrical symmetry).
   b) The electric field intensity in polystyrene ($_r = 2.55$) filling the space between the plates of a
       parallel-plate capacitor is 10 kV/m. The distance between the plates is 1.5 mm. Calculate:
       (i) *D,* (ii) *P,* (iii) The surface charge density of free charge on the plates, (iv) The surface
       density of polarization charge and (v) The potential difference between the plates.

UNIT-III
6. a) Derive the Lorentz force equation.
   b) Derive an expression for MFI due to circular ring located on xy plane at point P(0,0,h).

(OR)

7. a) Derive the expression for magnetic flux density at a point due to a straight current carrying filamentary conductor of (i) finite length (ii) semi finite length.

   b) The conducting triangular loop in Fig. carries a current of 10 A. Find H at (0, 0, 5) due to side 1 of the loop.
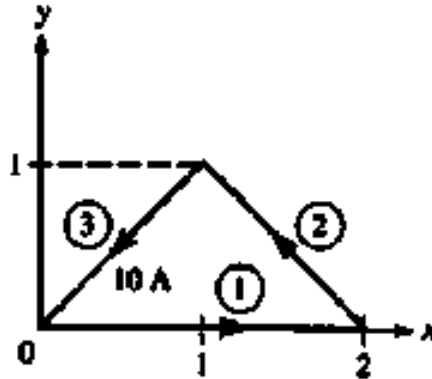
UNIT-IV

8. a) Derive the expression for the torque on a current loop placed in a magnetic field.

   b) A point charge of 4 Coulomb's is moving with a velocity of $5u_x + 6u_y + 7u_z$ m/s. Find the force exerted (i) If the electric field intensity (**E**) is $15u_x + 8u_y - 5u_z$ v/m (ii) If the flux density (**B**) is $5u_x + 7u_y - 9u_z$ wb/m^2 (iii) Both **B** and **E** acting together.

(OR)

9. Find out the expressions for magnetic vector potential within a co-axial cable. Derive the expression of magnetic field from magnetic vector potential and plot the variation of both the variables with radial distance.

UNIT-V

10. Write Maxwell's equation in free space for the time varying fields both in differential and integral form. Why these equations are not completely symmetrical?

(OR)

11. a) State Ampere's law, also prove that (Del) X **H** = **J**.

    b) Explain briefly the concept of 'Displacement Current'. How is this current different from conduction current?

AR13 | SET 02

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March, 2015
THERMODYNAMICS
(MECHANICAL ENGINEERIG)

Time: 3 Hours   **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1. a) Define thermodynamic system
    b) What is PMM-1?
    c) Expression for pdV work in case of isothermal process
    d) State Inequality of Clausius
    e) define availability
    f) Define pure substance
    g) Define Dalton's law of partial pressure
    h) Define relative humidity
    i) State the four process which constitute the Stirling cycle
    j) Define compression ratio.

PART-B

Answer one question from each unit   **[5 x 12 = 60 M]**

UNIT - I

2. (a) A piston and cylinder machine containg fluid system has a stirring device in the cylinder. The piston is frictionless, and it is held down against the fluid due to the atmospheric pressure of 101.325 kPa . The stirring device is turned 10,000 revolutions with an average torque against the fluid of 1.275 mN. Mean while the piston of 0.6 m diameter moves out 0.8 m. Find the net work transfer for the system.
    (b) Derive the expression for pdV-work in a case of a polytropic process.

(OR)

3. (a) Show that internal energy is a property of a system
   (b) The internal energy of a certain substance is given by the following equation $u = 3.56pv+84$ where u is given kJ/kg, p is in kPa, and v in m^3/kg. A system composed of 3kg of this substance expands from an initial pressure of 500 kPa and a volume of 0.22 m^3 to a final pressure 100 kPa in a process in which pressure and volume are related by $pv^{1.2}$= constant. If the expansion is quasi-static, find Q, u and W for the process.

UNIT-II

4. In a steady flow apparatus 135kj of work is done by each kg of fluid. The specific volume of the fluid, pressure and velocity at the inlet are $0.37m^3$/kg, 600 kPa, and 16 m/sec. The inlet is 32 m above the floor, and the discharge pipe is at floor level. The discharge conditions are 0.63 m^3/kg, 100 kPa, and 270 m/sec. the total heat loss between the inlet and discharge is 9kJ/kg of fluid. In flowing through this apparatus, does the specific internal energy increase or decrease, and by how much?

(OR)

5. (a) Establish the equivalence of Kelvin -plank and clausius statements
   (b) A cyclic heat engine operates between a source temperature of 800^0C and a sink temperature of 30^0C. What is the least rate of heat rejection per kW net output of the engine?

UNIT-III

6. (a) What is available energy and unavailable energy?
   (b)Calculate the decrease in available energy when 25 kg of water at 95^0C mix with 35 kg of water 35^0C, the pressure being taken as constant and the temperature of the surroundings being 15^0C

(OR)

7. (a) Define dryness fraction of the steam and show the T-S and h-s diagrams.
   (b) Find the enthalpy, entropy and volume of steam at 1.4 MPa , 380^0C

UNIT-IV

8. 0.5 kg of air is compressed reversibly and adiabatically from 80 kPa , 60^0C to 0.4 MPa, and is then expanded at constant pressure to the original volume. Sketch these processes on the P-V plane and compute work transfer for the whole path

(OR)

9. A mixture of ideal gases consists of 3 kg of Nitrogen and 5kg of carbon dioxide at a pressure of 300 kPa and a temperature of 20^0C. Find (a) the mole fraction of each constituent (b) equivalent molecular weight of the mixture (c) the partial pressure s and the partial volumes (d) the volume and density of the mixture.

UNIT-V

10.(a) State the assumptions of air standard cycles
   (b) A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find air standard efficiency

(OR)

11.Explain the working of vapor compression refrigeration cycle with neat sketch and also sketch these processes on the T-s and P- h planes.

AR13   SET 01

Time: 3 Hours   **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1. (a) Determine Laplace transform of Sinh t.
   (b) State convolution theorem.
   (c) What is advantage of using Laplace transform in analysis of electrical networks?
   (d) Give relationship between neper and decibel.
   (e) What is objective of using Network Theorems?
   (f) Are network theorems applicable to a.c. networks, answer with proper justification.
   (g) An R-L series circuit of R = 10 ohm and L = 1H is connected across a d.c. voltage of 100V. What is amplitude of current flowing in the circuit?
   (h) Give merits of active filters over passive filters.
   (i) List advantages of a m-derived filters.
   (j) State the condition for anti resonance.

PART-B

Answer one question from each unit   **[5 X 12 = 60 M]**

UNIT-I

2.a) On what basis different network elements are classified. State the relevant characteristics of each type with an example.

b) Find the current through a 5-H inductor if the voltage across it is

$$v(t) = \begin{cases} 30t^2, & t > 0 \\ 0, & t < 0 \end{cases}$$

Also find the energy stored within $0 < t < 5\ s$

c) For the circuit shown in below Fig., find the voltage across each capacitor.
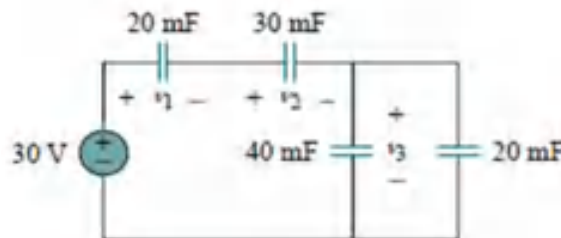
(OR)

3.a) What is the difference between Ideal and Practical energy sources? Explain briefly about dependent and independent sources.

b) Using source transformation find the power associated with the 6 V source? State whether the 6 V source is absorbing or delivering power.
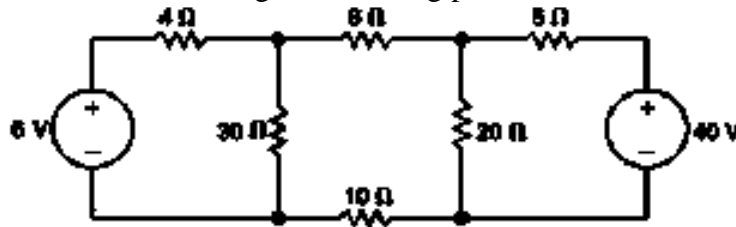
UNIT-II

4. Calculate the Root mean square value, average value and peak factor of the following wave forms.
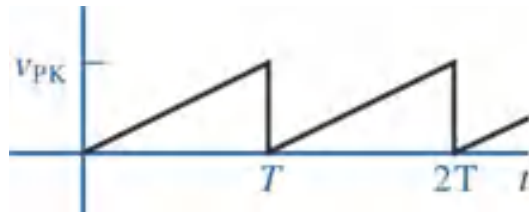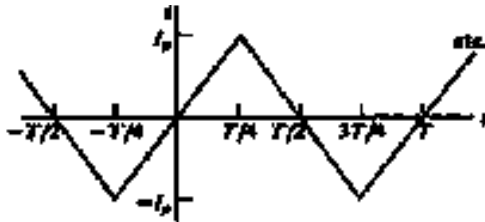
(OR)

5..Write short notes on
   i.   duality
   ii.. planar non planar graph
   iii. tie set
   iv cut set

UNIT-III

6. a) Two magnetically coupled coils have 500 and 1000 turns respectively. A current of 1A in coil 1 produces a flux of 0.5mWb links all turns of the coil 1 only and a mutual flux of 0.7mWb. Find L_1, L_2.

b) A coil of 2.2   resistance and 0.01H is connected in series with a capacitor across 220V mains. Find the value of capacitance such that the maximum current flows in the circuit at a frequency of 100Hz. Also, find the current and voltage across the capacitor.

(OR)

7.a) Describe V-I and V-P relationship in phasor form, for an R-L circuit with sinusoidal excitation.

b) For the circuit shown below the source voltage is sinusoidal as given by

$$v_s(t) = 750\cos(5000t + 30^\circ)$$

   i) Construct the frequency-domain (phasor, complex) equivalent circuit?
   ii) Calculate the steady state current i(t) ?
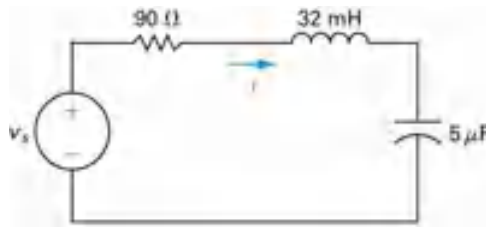
UNIT-IV

8. Find the Thevenin equivalent and Norton equivalent circuit for the circuit shown below, to the left of the terminals *a-b*. Then find the current through $R_L = 6$, 16 , and 36 .
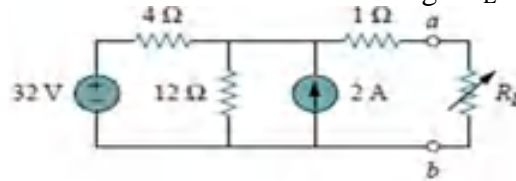
(OR)

9. a) Derive the conversion of h-parameter to Z-parameter in a two port network.
   b) Find the Y-parameters of the two-port network shown in figure below.
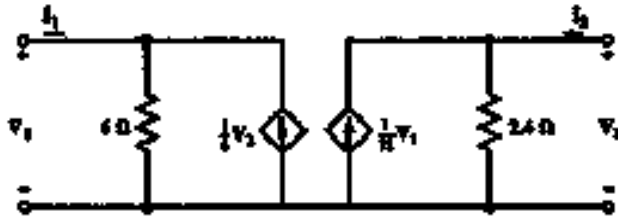
UNIT-V

10. Derive the current response *i(t)* and $i_R(t)$ for t > 0 of a parallel RLC circuit as shown in figure below.
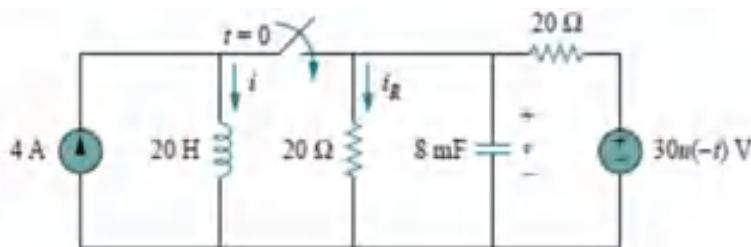
(OR)

11. A low-pass T section filter having a cut-off frequency of 15 kHz is connected in series with a high-pass T section filter having a cut-off frequency of 10 kHz. The terminating impedance of the filter is 600 .
   (a) Determine the values of the components comprising the composite filter.
   (b) Sketch the expected attenuation against frequency characteristic.
   (c) State the name given to the type of filter described.

AR13   SET 02

Time: 3 Hours   **Max Marks: 70**
PART-A
Answer all questions: **[1 X 10 = 10M]**

1. a) What is meant by Current?
    b) State Krichoff's Voltage Law
    c) Give short notes on resistor.
    d) What is the basic principle of a dc generator?
    e) EMF equation of single phase transformer?
    f) Define slip.
    g) What are the deferent types of d.c motors?
    h) Which type of instrument is called as universal instrument?
    i) What is Avalanche Breakdown?
    j) What is the difference between diode and transistor?

PART-B
Answer One Question From Each Unit   **[5X12=60M]**
UNIT-I

2) a) Derive the formula for a star connected network is converted into a
       Delta network?   [6M]

    b) Compare the series and parallel resistance circuits.   [6M]

(OR)
3) a) Find the equivalent resistance between A and B of the circuit shown below   [6M]
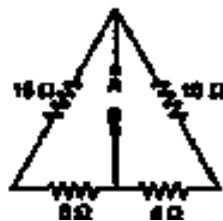
    b) What is the value of resistance 'R' in the circuit shown below, if the voltage drop across
       the 500 ohm resistor is 2.5 volts? All resistance are in ohms.   [6M]
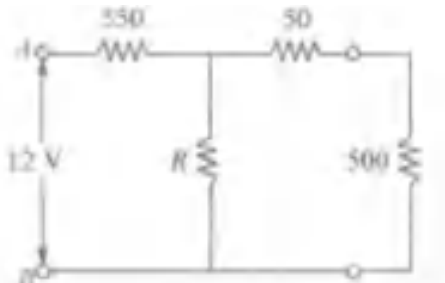
UNIT-II

4) a) An 8-pole D.C shunt generator with 778 wave connected armature conductors and running at 500rpm supplies a load of 12.5 ohm resistance at terminal voltage of 250v. The armature resistance is 0.24 ohm and filed resistance is 250 ohm. Find the induced emf, flux per pole and armature current.   [6M]

   b) Explain different losses in DC Machine.   [6M]

(OR)

5) a) Derive the torque equation of DC motor.   [6M]
   b) Explain the working principle and main parts of Dc generator   [6M]

UNIT-III

6) a) 3- 4 pole induction motor is supplied from 3   50Hz ac supply. Find   [6M]
   (1) synchronous speed
   (2) rotor speed when slip is 4%
   (3) the rotor frequency when runs at 600r.p.m.

   b) Explain the principle of operation of alternator.   [6M]

(OR)

7) With neat diagram explain the working of a transformer and derive emf equation.   [12M]

UNIT-IV

8) a) Explain different torques required for satisfactory operation of indicating instruments. [6M]
   b) What are advantages of MI instruments   [6M]

(OR)

9) Describe the construction and working principle of MI instrument and Derive an

   Expression of the deflecting torque.   [12M]

UNIT-V

10) a) Explain V& I characteristics of P-N junction diode.   [6M]

   b) Explain the operation of NPN and PNP transistor.   [6M]

(OR)

11) Draw and explain the operation full wave bridge rectifier with wave forms.   [12M]