AR13

CODE: 13CE2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Jan / Feb- 2016
FLUID MECHANICS
(CIVIL ENGINEERING)

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

PART –A

ANSWER ALL QUESTIONS **[1x10=10M]**

1. a) What is specific gravity of a fluid?
   b) What is surface Tension of a fluid?
   c) What is hydro static force?
   d) What is expression of total pressure for vertically immersed bodies?
   e) What is irrotational flow?
   f) What is one dimensional flow?
   g) What is expression of loss of energy due sudden contraction?
   h) What is steady laminar flow?
   i) What do you mean by Hydraulic gradient line and Total energy line?
   j) What is broad crested weir?

PART-B

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

UNIT-I

2. a) Two horizontal plates are placed 1.25cm apart, the space between them being filled with oil of viscosity 14 poises. Calculate the shear stress in oil if upper plate is moved with a velocity of 2.5 m/s?
   b) What is the difference between U-tube differential Manometer and Inverted U-tube differential Manometers? Where are they used?

(OR)

3. a) What are the different types of fluids?
   b) Define atmospheric pressure, gauge pressure, vacuum pressure,

UNIT-II

4. a) A rectangular plane surface 2m wide and 3m deep lies in water in such a way that its plane makes an angle of 30^0 with the free surface of water. Determine the total pressure and position of centre of pressure when the upper edge is 1.5m below the free surface?
   b) Derive the expression of centre of pressure and total pressure on inclined surface immersed in a liquid?

(OR)

5. a) Explain how you would find the resultant pressure on a curved surface immersed in a liquid?
   b) A trapezoidal channel 2m wide at the bottom and 1m deep has side slopes 1:1 determine the total pressure and centre of pressure on the vertical gate closing channel when it is full of water?

AR13

CODE: 13CE2004 **SET2**

UNIT-III

6. a) The velocity potential function is given by an expression Ø = $x^2 - y^2$. Find the velocity components in x and y direction and show that Ø represents a possible case of flow?
   b) Define stream function, velocity potential function, and flow net.

(OR)

7. a) The velocity potential function is given by an expression Ø = $(-xy^3/3)-(x^2)+(x^3y/3)+(y^2)$ find the velocity components in x and y direction and show that Ø represents a possible case of flow?
   b) Classify various types of flows?

UNIT-IV

8. a) A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200mm diameter at a position A to 500mm diameter at position B which is 4m at a higher level. If the pressures at A and B are 9.81N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200ltrs/sec. determine the loss of head and direction of flow?
   b) What is Euler's equation of motion? How will you obtain Bernoulli's expression from it?

(OR)

9. a) Explain with neat sketch Reynolds's experiment? What are the conclusions from this experiment?
   b) The water is flowing in a pipe having diameters 20cm and 10cm at section 1 and 2 respectively. The discharge through the pipe is 35 liters/sec. The section 1 is 6m from datum line and section 2 is 4m from datum. If the pressure at section 1 is 30 N/cm^2. Find the pressure at section 2?

UNIT-V

10. a) Define orifice meter? Derive the expression for the discharge through a orifice meter?
    b) Explain with neat sketches the various minor losses in pipe flow with their expressions?

(OR)

11. a) The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5m. The rise of water level in this tank is 1.0m in 25 seconds. Also the coordinates of a point on the jet, measured from vena-contracta are 4.3 m horizontal and 0.5 m vertical. Find the coefficients Cd , Cc, and Cv ?
    b) Define the following in detail with neat sketches
    Pipes in series, pipes in parallel, Hydraulic gradient line, Total energy line

***

AR13

Code: 13EE2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech. I Semester Supplementary Examinations, January/February,2016

ELECTRO MAGNETIC FIELDS
(ELECTRICAL & ELECTRONICS ENGINEERING)

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

PART – A

Answer all questions **[1 x 10 = 10M]**

1. a) Define scalar & vector field.
   b) Define divergence.
   c) What do you mean by Gaussian surface.
   d) State Coulomb's law.
   e) Define Electric field intensity.
   f) Write the expression for Laplace's equation.
   g) If $\mu_r = 4$, what is magnetic susceptibility.
   h) State Ampere's Circuital law.
   i) Define Faraday's laws?
   j) What is Poynting vector?

PART – B

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

UNIT - I

2. Derive the expression for electric field intensity due to a sheet of charge with charge density ρ_s C/m^2. [12M]

(OR)

3. Consider a sphere of radius 'a' with a uniform charge density ρ_v C/m^3. Determine flux density **D** everywhere using Gauss's law. [12M]

UNIT – II

4. (a) Derive the expression for capacitance of a spherical capacitor. [6M]
   (b) A parallel-plate capacitor has plate area 200 cm^2 and plate separation of 3 mm. the charge density is 1 μ C/m^2 and air is the dielectric, Find
   (i) Capacitance of the capacitor. (ii) Voltage between the plates. [6M]

(OR)

5. Derive the equations for dielectric-dielectric boundary conditions and derive the equation for law of refraction of the electric field at a boundary with free of charge ($\rho_s = 0$). [12M]

AR13

Code: 13EE2006 **SET-2**

UNIT – III

6. State Biot-savart's law and derive the expression for magnetic field intensity due a straight current carrying filamentary conductor of finite length AB and also derive the expression for magnetic field intensity when the conductor is infinite in length. [12M]

(OR)

7. An infinity long conductor carries 2A current in the positive Z direction.
   (i) Calculate **B** at (-3, 4, 7)
   (ii) Find the flux through the square loop described by $2 \leq \rho \leq 6, 0 \leq z \leq 4, \phi = 90^0$. [12M]

UNIT – IV

8. Define magnetic dipole moment and derive the expression for the torque on a current loop place in a magnetic field. [12M]

(OR)

9. (a) Derive Lorentz force equation. [6M]
   (b) Derive the expression for force on a current element in a magnetic field. [6M]

UNIT – V

10. Determine the self-inductance of a coaxial cable of inner radius 'a' and outer radius 'b'. [12M]

(OR)

11. Write all the Maxwell's equations in point and integral forms for time varying fields. [12M]

***

AR13 SET 02

CODE: 13ME2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Jan / Feb- 2016
THERMODYNAMICS
(MECHANICAL ENGINEERIG)

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

PART-A

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

1. a) Write the difference between open and closed systems
   b) Differentiate between flow process and non-flow process.
   c) Define flow energy
   d) What is principle of increase in entropy?
   e) What is pure substance and give example?
   f) Define dryness fraction.
   g) What is superheated steam?
   h) What is availability?
   i) Differentiate between dry bulb temperature and wet bulb temperature
   j) Name the processes in Dual cycle.

PART-B

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

UNIT-I

2. (a) Derive the work done equation of a isothermal process?
   (b) A steam radiator in a room at 25°C has saturated water vapor at 110 kPa flowing through it, when the inlet and exit valves are closed. What is the pressure and the quality of the water, when it has cooled to 25°C? How much work is done?

(OR)

3. (a) What is irreversible process? Give an example of irreversible process.
   (b) A piston/cylinder contains 1 kg water at 20°C with volume 0.1 m^3. By mistake someone locks the piston preventing it from moving while we heat the water to saturated vapor. Find the final temperature and the amount of heat transfer in the process.

UNIT-II

4. (a) What is PMM1? Why it is impossible?
   (b) The compressor of a large gas turbine receives air from the ambient at 95 kPa, 20°C, with a low velocity. At the compressor discharge, air exits at 1.52 MPa, 430°C, with velocity of 90 m/s. The power input to the compressor is 5000 kW. Determine the mass flow rate of air through the unit.

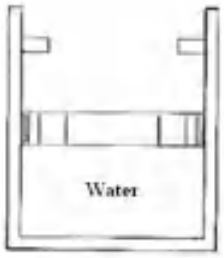
(OR)

5. (a) State Kelvin Planck's statement of second law of thermodynamics
   (b) An air conditioner cools a house at T_L = 20°C with a maximum of 1.2 kW power input. The house gains 0.6 kW per degree temperature difference to the ambient and the refrigeration COP is $\beta = 0.6\ \beta_{Carnot}$. Find the maximum outside temperature, T_H, for which the air conditioner provides sufficient cooling.

UNIT – III

6. (a) A constant pressure piston/cylinder contains 1 kg of water at 4 MPa and 100°C. Heat is added from a reservoir at 600°C to the water until it reaches 600°C. We want to find the total irreversibility in the process. Assume ambient temperature to be 20°C.

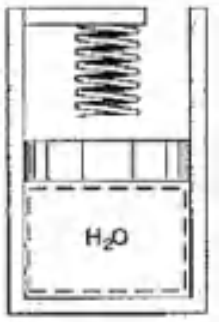
   (b) A piston/cylinder contains 50 kg of water at 200 kPa with a volume of 0.1 m^3. Stops in the cylinder restrict the enclosed volume to 0.5 m^3 as shown in the Fig. The water is now heated to 200°C. Find the final pressure, volume and the work done by the water.



(OR)

7. (a) Eighty kg of water at 100^0C are mixed with 50 kg of water at 60^0C, while the temperature of the surroundings is 20^0C. Determine the decrease in available energy due to mixing.

   (b) A cylinder/piston arrangement contains water at 105°C, 85% quality with a volume of 1 L. The system is heated, causing the piston to rise and encounter a linear spring as shown in Fig. At this point the volume is 1.5 L, piston diameter is 150 mm, and the spring constant is 100 N/mm. The heating continues, so the piston compresses the spring. What is the cylinder temperature when the pressure reaches 200 kPa?



UNIT – IV

8. Determine the gas constant, density and partial pressures of the components of a gas mixture consisting of 10 mass fractions of air and 1 mass fractions of lighting gas. Take the density of lighting gas $\rho = 0.5$ kg/m^3 at 101325 N/m^2 pressure and 273 K temperature.

(OR)

9. A 5m × 5m × 3m room contains air at 25°C and 100 kPa at a relative humidity of 75 percent. Determine (*a*) the partial pressure of dry air, (*b*) the specific humidity, (*c*) the enthalpy per unit mass of the dryair, and (*d*) the masses of the dry air and water vapor in the room.

UNIT – V

10. An air-standard Otto cycle with a compression ratio of 11, sucks air at 100 kPa and 310K before compression stroke. The compression and expansion processes are modeled as polytropic process with index of 1.3. Maximum pressure in the cycle is 8 MPa. Calculate the thermal efficiency of the cycle, the net work done, temperature at the end of expansion process, the mean effective pressure and maximum temperature in the cycle?

(OR)

11. An ideal air-standard Diesel cycle engine has a compression ratio of 18 and a cutoff ratio of 2. At the beginning of the compression process, the working fluid is at 100 kPa, 27°C. Determine the temperature and pressure of the air at the end of each process, the network output per cycle, and the thermal efficiency.

AR13 SET 02

CODE: 13EE2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Jan / Feb- 2016
NETWORK ANALYSIS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

PART-A

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

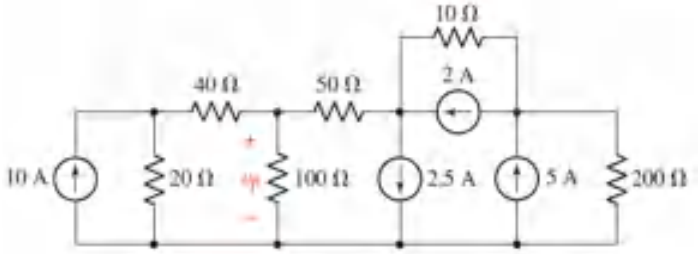
1. (a) Obtain the Laplace transform of f(t) = 1- e^{st}, s being a constant.
   (b) Find the derivative of a unit ramp function.
   (c) Explain the homogeneity property of superposition theorem.
   (d) Time constant of an R-L circuit is given by L/R. Show that the unit of L/R is second.
   (e) Differentiate between loop analysis and nodal analysis.
   (f) Name circuit elements of an a.c. network and classify them as passive elements and active elements.
   (g) Define parabolic and impulse signals
   (h) Define ohms law?
   (i) How are filters classified?
   (j) List the demerits of a m derived filter.

PART-B

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

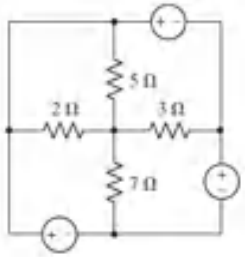
UNIT-I

2.a) State KCL. Explain the current division rule.
b) Use nodal analysis to find v_p in the circuit shown in Fig.



(OR)

3.a) State KVL. Explain the voltage division rule.
b) Find the current flows through 3ohm resistor, if the voltage sources are 50V in the circuit.

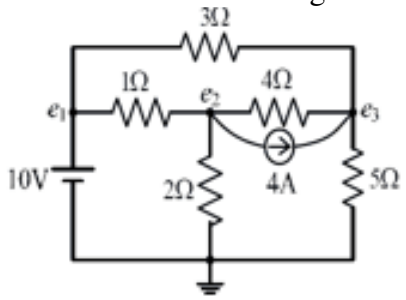


UNIT-II

4 a) What is phasor representation? How to represent a sinusoidal quantity in phasor and complex form, give a relevant example.
b) If $y_1 = 20\cos\left(wt - 30^0\right)$ and $y_2 = 40\cos\left(wt + 60^0\right)$ express $y = y_1 + y_2$ as a single sinusoidal function.
i) Solve by using trigonometric identities.
ii) Solve by using the phasor concept.

(OR)

5. For electrical circuit shown below fig draw its topological graph and write its incident matrix. Find tree, fundamental loop, tie set and cut sets of the given network



UNIT-III

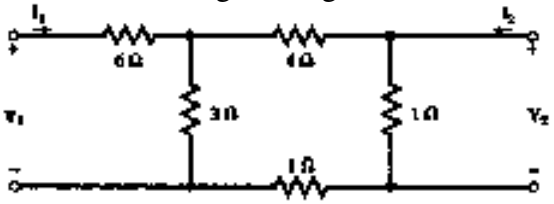
6.a) Derive an expression for co-efficient of coupling in a magnetic circuit.
b) Explain about dot convention in magnetic circuits.

(OR)

7. a) In RLC parallel circuit describe the condition for parallel resonance.
b) Define half power frequency band width and quality factor.

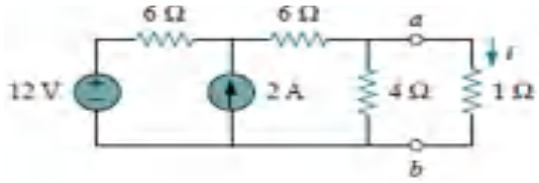
UNIT-IV

8. a) Find the H-parameters of any 2 two port network.
b) Find the Z-parameters of the circuit in given Fig.



(OR)

9. a) Define reciprocity theorem with an example.
b) Using Thevenin's theorem, find the equivalent circuit to the left of the terminals *a-b* in the circuit. Then find *i*.



UNIT-V

10. A coil having an inductance of 6 H and a resistance of R Ω is connected in series with a resistor of 10 Ω to a 120 V, d.c. supply. The time constant of the circuit is 300 ms. When steady-state conditions have been reached, the supply is replaced instantaneously by a short-circuit. Determine: (i) the resistance of the coil,(ii) the current flowing in the circuit one second after the shorting link has been placed in the circuit, and (iii) the time taken for the current to fall to 10% of its initial value.

(OR)

11. A filter section is required to have a nominal impedance of 600 Ω, a cut-off frequency of 5 kHz and a frequency of infinite attenuation at 5.50 kHz. Design (a) an appropriate 'm derived' T section, and (b) an appropriate 'm-derived' π section.

***

AR13 SET 01

CODE: 13EE2003

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Jan / Feb- 2016
ELECTRICAL & ELECTRONICS ENGINEERING
(Common to CSE & IT)

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

PART-A

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

1. (a) Define linear element?
   (b) What is the difference between circuit and network?
   (c) Why capacitor does not allow sudden change in voltage?
   (d) Define passive element?
   (e) What is the function of a transformer?
   (f) Define the voltage regulation?
   (g) What is the condition to obtain the maximum efficiency of a Transformer?
   (h) Which method is used to obtain the speeds above rated speed?
   (i) Define the deflecting torque?
   (j) Draw the basic symbol of the n-p-n transistor?

PART-B

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

UNIT-I

2. a) Prove that the reciprocal of the total resistant is equal to the sum of the reciprocals of the individual resistances. [6M]
   b) A current of 20amps flowsthrough two ammeters A and B joined in series. The p.d across A is 0.2V while that across B is 0.3V. Find how the same current will divide between A and B when they are joined in parallel. [6M]

(OR)

3. a) Define the following with examples
   i. ohm's Law
   ii. KCL
   iii. KVL [6M]
   b) An electrical network shown in fig.1, find (i) the current in branch AF (ii) the power absorbed in branch BE and (iii) p.d across the branch CD [6M]

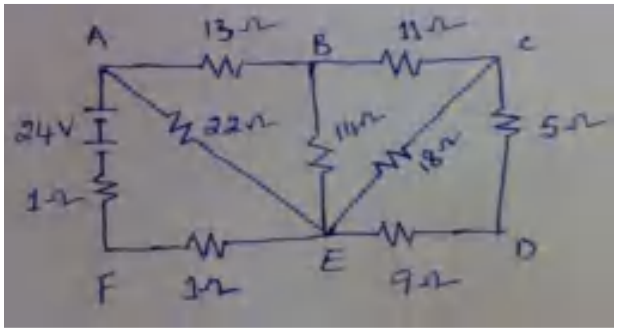


Fig.1

UNIT – II

4. Explain the construction and working of D.C Generator? [12M]

(OR)

5. What are the types of DC generators, Explain each of them with relevant expressions? [12M]

UNIT- III

6. a) Draw the phasor diagram of a No-load transformer? [6M]
   b) A single phase transformer has 1000turns on the primary and 200turns on the secondary. The no load current is 3A at a p.f of 0.2 lagging. Calculate the primary current and power factor when the secondary current is 280A at a p.f of 0.8 lagging. [6M]

(OR)

7. Explain the construction and operation of an alternator? [12M]

UNIT- IV

8. What are the essential requirements of the indicating instruments, Explain each of them? [12M]

(OR)

9. Explain the construction and working of Permanent magnet moving coil Instruments? [12M]

UNIT- V

10. a) Sketch the forward and reverse characteristics of a silicon p-n junction diode and describe the shapes of the characteristicsdrawn. [6M]
    b) State briefly what you understand by the terms:
    (i) Reverse bias (ii) diffusion (iii) minority carrier conduction. [6M]

(OR)

11. a) Explain briefly the action of a p-n junction diode:
    (i) on open-circuit, (ii) when provided with a forward bias, and(iii) when provided with a reverse bias. Sketch the characteristiccurves for both forward and reverse bias conditions. [6M]
    b) Explain the transistor characteristics? [6M]