AR13 SET-2

Code: 13CE2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, August-2015

HYDRAULICS AND HYDRAULIC MACHINERY
(CIVIL ENGINEERING)

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

PART-A

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

1. a) Give the dimensions of the following Physical Quantities:
   (i) Dynamic viscosity (ii) Kinematic Viscosity.
   b) Explain the term 'dimensional homogeneity equation'.
   c) What do you understand by most economical section of a channel?
   d) Distinguish between hydraulic mean depth and hydraulic radius
   e) Distinguish between Gradually varied flow and Rapidly varied flow
   f) Define the term impact of jet
   g) Define hydraulic efficiency and mechanical efficiency of turbine.
   h) On what factors does the number of jets depend in the case of Pelton wheel?
   i) Difference between static head and manometric head
   j) What is priming in the case of centrifugal pumps?

PART –B

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

UNIT-1

2. Using Buckingham Π - theorem, show that velocity of fluid through a circular orifice is given by $V = \sqrt{2gh}\ \phi\left(\frac{D}{H}, \frac{\mu}{\rho VH}\right)$, where H is the head causing flow, D is the diameter of the orifice, μ is co-efficient of viscosity, ρ is the mass density and g is the acceleration due to gravity.

(OR)

3. a) How are the repeating variables selected for dimensional analysis?
   b) What are the methods of dimensional analysis? Describe the Rayleigh's method for dimensional analysis.

Code: 13CE2007

UNIT-1I

4. a) Prove that for the trapezoidal channel of most economical section
   i) Half of top width = length of one of the sloping slides
   ii) Hydraulic mean depth =1/2 depth of flow
   b) A rectangular concrete channel (N= 0.012) is to be convey a discharge of 8.40 m^3/sec at a velocity of 0.7 m/sec, the bed slope being 0.00006. Find the most economical dimensions of the channel.

(OR)

5. a) Show that at the critical state of flow, the specific energy in rectangular channel is equal to 1.5 times the depth of flow.
   b) Differentiate between GVF and RVF? Illustrate with neatly drawn sketches.

UNIT-I1I

6. a) Derive an expression for force exerted by the jet of water on moving curved plate?
   b) An experiment was conducted on Impact of Jet in the Hydraulics and Hydraulic Machinery Laboratory and the following values were observed.
   i. Diameter of Pipe is 40 cm
   ii. Diameter of Jet is 7.5 cm
   iii. Velocity of Jet is 20 m/sec.

   Conditions: I. Plate is at rest. II. Plate is moving in the same direction of flow with vel. 5m/sec. Based on the observations find out the thrust and work done/sec for condition I & ii. And also calculate the efficiency of the jet for condition ii.

(OR)

7. a) Obtain an expression for the force exerted by a jet of water on a fixed inclined plate in the direction of the jet.
   b) A jet of water of diameter 8 cm strikes a curved plate at its center with a velocity of 20 m/s. The curved plate is moving with a velocity of 9 m/s in the direction of the jet. The jet is deflected through an angle of 165^0. Assuming the plate smooth find:
   (i) Force exerted on the plate in the direction of jet,
   (ii) Power of the jet and
   (iii) Efficiency of the jet.

Code: 13CE2007

UNIT-IV

8. a) A fieldwork was organized for II/IV B.Tech Civil Engineering students of AITAM, to observe the mechanism and working of the Pelton Turbine in a Dam site. The values that were observed during their visit were Overall efficiency 80% ; Power developed=103 kW Shaft Power
Under the head of 80 m and speed 300 r.p.m. Design a Pelton turbine based on the above values.

b) Classify the turbines based on head, specific speed and hydraulic actions. Give examples for each.

(OR)

9. a) Explain the working principal of Francis turbine with neat sketch.
b**)** Define specific speed of a turbine and derive an expression for the same.

UNIT-V

10. a) A centrifugal impeller has inner and outer diameters are 225 mm and 450 mm respectively. It is running at a speed of 1000 RPM. The blade angle of impeller is 30^0 at outlet. If the velocity of flow is 2.20 m/sec, compute the following.
(i). Absolute Velocity at outlet.
(ii). Head developed by the pump when Manometric efficiency is 0.85. (iii).Blade angle at inlet.
b) Draw the velocity triangles for centrifugal pump and derive an equation for the manomatric head and efficiency.

(OR)

11. a) What do you understand by the characteristic curves of centrifugal pump? What is the significance of characteristics of curves?
b) Define cavitation. What are the effects of cavitation? Give the necessary precautions against cavitation.

***

AR13 SET-1

Code: 13EE2011

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, August-2015

ELECTRICAL MACHINES – II

(ELECTRICAL AND ELECTRONICS ENGINEERING)

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

PART-A

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

1. a) What is the difference between exact equivalent circuit and approximate equivalent circuit of a transformer?
   b) Define voltage regulation, state the condition for zero voltage regulation
   c) What is all day efficiency?
   d) What are the different losses in transformer?
   e) A 4-pole, 50Hz induction motor running at 1440 rpm, find the frequency of rotor induced emf?
   f) State the condition for maximum starting torque.
   g) Name the tests required to estimate equivalent circuit parameters of induction motor.
   h) Mention the starting methods which can be employed only for slip ring induction motors.
   i) Name the methods for controlling the speed of induction motor from the rotor side.
   j) What is the reason of inrush current during switching of transformer?

PART-B

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

UNIT-I

2. Explain the difference between core and shell type transformer. Obtain the expression for induced e.m.f. of transformer? Explain how the magnetizing flux of transformer core remains same irrespective of load. [12M]

(OR)

3. a) Develop the phasor diagram of a single-phase transformer under no load condition. [5M]
   b) A 10 kVA single phase transformer designed for 2000/400 volts has the following constants: $R_1 = 5.5$; $R_2 = 0.2$; $X_1 = 12$; $X_2 = 0.45$. Calculate the approximate value of the secondary terminal voltage at full load, 80 percent power factor (lagging), when the primary supply voltage is 2000 volts. [7M]

Code: 13EE2011

UNIT-II

4. a) Explain the presence of third harmonic component in phase and line voltage for different connections of three phase transformer. [5M]

   b) A 10 kVA, 2500/250 Volts single phase, two winding transformer is used as an auto transformer to raise the supply voltage of 2500 V to an output voltage of 2625 V. The l.v. winding of the transformer consists of two equal parts of 125 V each. If both parts of the low voltage windings are used, determine [7M]
   i. auto-transformer kVA output and
   ii. kVA transformed and conducted.

(OR)

5. a) Explain with the help of connection and phasor diagrams, how Scott connections are used to obtain two-phase supply from 3-phase supply mains. [6M]

   b) A 10 kVA, 2500/250 Volts single phase transformer gave the following test results: [6M]
   Open circuit test: 250V, 0.8A, 50W
   Short circuit test: 60V, 3A, 45W
   i. Calculate the efficiency at ¾ of full load at 0.75 p.f.
   ii. Calculate the load at which maximum efficiency occurs and also the value of maximum efficiency at 0.75 p.f.

UNIT-III

6. a) Explain how the rotating magnetic field is produced in a three phase induction motor. [7M]

   b) A four-pole 3hp, 440 volt, 60 cycle Y connected induction motor having a squirrel cage rotor has the following parameters: $R_1 = 2.4$; $R_2 = 2.3$; $X_1 = 5$; $X_2 = 4.6$, all expressed in primary ohms per phase; $G_0 = 3.2 \times 10^{-5}$, $B_0 = 1.0 \times 10^{-2}$ mho per phase. Indicate in primary terms, for a slip of 3 percent [5M]
   i. The exact equivalent circuit
   ii. The power output in watts and the torque in N-m.

(OR)

7. a) Draw the equivalence circuit diagram of induction motor, derive the expression of developed mechanical power and torque. [6M]

   b) Derive the relation between P_2, P_c, P_m. [6M]

Code: 13EE2011

UNIT-IV

8. Draw the circle diagram for 3-phase, 3hp, 4-pole, 60HZ, 440V, star connected induction motor from the following data (line values) [12M]

No-load test: 440V, 2.2A, 202W

Blocked rotor test: 110V, 5.9A, 490W

The primary DC resistance 1.4 ohm per phase; the AC resistance is 40 perc greater. From the circle diagram determine:

(i) the point at which motor delivers 5 hp (ii) power factor and efficiency at point (iii) the maximum torque and slip at which it occurs.

(OR)

9. A 15 hp 440 volts three phase Y connected 60 cycle squirrel cage induction motor has an efficiency of 89 percent and a power factor of 90 percent when running at full load. The starting current at full voltage is 7 times full load current and is to be reduced to 2.5 times full load current by means of a starting compensator. Compute the percentage tapping of an autotransformer necessary for this result. Neglect saturation and no load admittance. [12M]

UNIT-V

10. a) Explain in detail the rheostatic speed control method of induction motor and give an application. [6M]

b) Explain the principle of speed control by frequency converter [6M]

(OR)

11. Explain in detail Kramer system of speed control in induction machine with neat sketch. Using [12M]

i. regulating transformer

ii. rotary converter and dc motor.

***

AR13 SET-1

Code: 13ME2010

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, August-2015

DESIGN OF MACHINE MEMBERS - I

(MECHANICAL ENGINEERING)

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

PART-A

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

1. a) What do you mean by stress concentration?
   b) According to Maximum Distortion Energy Theory, when the failure of component occurs?
   c) What is the material used for rivets?
   d) What is meant by throat thickness in welded joints?
   e) What is meant by lead in screwed fasteners?
   f) What type of stresses is induced in a pressure vessel subjected to internal pressure?
   g) List different types of cotter joints?
   h) What types of stresses are induced in shafts?
   i) Draw the neat sketch of sleeve and muff coupling?
   j) What is meant by spring rate?

PART-B

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

UNIT-I

2. (a) Explain the basic steps involved in machine design [6M]
   (b) Determine the diameter of a tensile member of a circular cross-section using Soderberg theory. The following data is given :
   Maximum tensile load = 10 kN; Maximum compressive load = 5 kN; Ultimate tensile strength = 600 MPa; Yield point = 380 MPa; Endurance limit = 290 MPa; Factor of safety = 4; Stress concentration factor = 2.2 [6M]

(OR)

3. a) Explain the purpose of preferred numbers used in design. [4M]
   b) A rotating shaft of 16 mm diameter is made of plain carbon steel. It is subjected to axial load of 5000 N, a steady torque of 50 N-m and maximum bending moment of 75 N-m. Calculate the factor of safety available based on 1. Maximum normal stress theory; and 2. Maximum shear stress theory. [8M]
   Assume yield strength as 400 MPa for plain carbon steel

UNIT-II

4. Design a double riveted lap joint for MS plates 9.5 mm thick. Calculate the efficiency of the joint. The permissible stresses are : σ_c = 150 MPa σ_s = 75 MPa, τ_t = 90 MPa, [12M]

(OR)

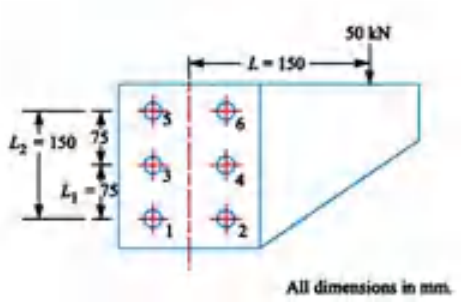
5. a) Classify types of welded joints. [4M]
   b) A low carbon steel plate of 0.7 m width welded to a structure of similar material by means of two parallel fillet welds of 0.112 m length (each) is subjected to an eccentric load of 4000 N, the line of action of which has a distance of 1.5 m from the centre of gravity of the weld group. Design the required thickness of the plate when the allowable stress of the weld metal is 60 MPa and that of the plate is 40 MPa. [8M]

AR13 SET-1

Code: 13ME2010

UNIT-III

6. A bracket is bolted to a column by 6 bolts of equal size as shown in Fig. 11.51. It carries a load of 50 kN at a distance of 150 mm from the centre of column. If the maximum stress in the bolts is to be limited to 150 MPa, determine the diameter of bolt. [12M]



(OR)

7. Derive the equation to determine the change in Dimensions of a Thin Spherical Shell due to an Internal Pressure [12M]

UNIT-IV

8. Design a knuckle joint to connect two mild steel rods which transmit a tensile force of 25 KN. The safe working stresses for tension, shear and crushing are 100 N/mm^2 , 60 N/mm^2 and 160 N/mm^2 respectively . [12M]

(OR)

9. (a) What materials are used for manufacture of shaft [4M]
   (b) Design a shaft to transmit power from an electric motor to a lathe head stock through a pulley by means of a belt drive. The pulley weighs 200 N and is located at 300 mm from the centre of the bearing. The diameter of the pulley is 200 mm and the maximum power transmitted is 1 kW at 120 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors for bending and twisting are 1.5 and 2.0 respectively. The allowable shear stress in the shaft may be taken as 35 MPa. [8M]

UNIT-V

10. A rigid flange coupling is used to transmit a torque of 215 N-m from a shaft of 35 mm diameter to another shaft of the same diameter. Design the hub, flange thickness and the bolt diameter on the basis of shear strength of the bolt material. Assuming the permissible stresses as follows: Shear stress for the material of the bolt = 40 MPa; Crushing stress for the material of the bolt = 80 MPa; Shear stress for the cast iron = 8 MPa. [12M]

(OR)

11. Design a helical compression spring to support an axial load of 3000 N. The deflection under load is limited to 60mm. The spring index is 6.The spring is made of chrome vanadium steel and factor of safety is equal to 2 [12M]

****

AR13 SET-1

Code: 13EC2011

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, August-2015

ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

PART-A

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

1. a) Define the term Electric Potential in electrostatic fields?
   b) State Gauss's law?
   c) Write the expressions for magnetic scalar potential and its units.
   d) Write the expression for energy stored in a static magnetic field.
   e) State the Maxwell's equations for free space.
   f) If the electric field strength of a radio broadcast signal at a TV receiver is given by E = 5.0 cos(ωt – βy)a_z V/m. Determine the displacement current density.
   g) Write the relation between E and H in uniform plane wave.
   h) Define polarisation of a wave.
   i) Express the range of VSWR.
   j) What is the input impedance of an infinite lined?

PART – B

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

UNIT – I

2. a) Derive Poisson's and Laplace's equations. [6M]
   b) If a fine filament carries a uniform charge distribution of ρ_L c/m, find the electric field at a point, $P_2(x_1, y_1, z_1)$ [6M]

(OR)

3. a) Find the electric field at any point due to an electric dipole. [6M]
   b) Calculate the potential at r_A = 3metres with respect to r_B = 9metres due to a point charge Q=500pC at the origin and zero reference at infinity. [6M]

UNIT – II

4. a) State and Prove Ampere's Circuital law. [6M]
   b) An infinitely long current element on *x*-axis carries a current of 1.0mA in a_x direction. Determine H at the point P(5,2,1). [6M]

(OR)

5. a) State and explain Biot-Savart's Law? [6M]
   b) The magnetic field in a current free region is $H = \frac{1}{\rho} a_\varphi$. The region is defined by $1 \leq \rho \leq 2m, 0 \leq \varphi \leq 2\pi$, and $0 \leq z \leq 2m$. Find the scalar magnetic potential at (4, 50^0, 2). [6M]

Code: 13EC2011

UNIT – III

6. a) Define and obtain the expressions for the Brewster angle. [6M]

   b) Find the electric flux density and volume charge density if the electric field, $E = x^2 a_x + 2y^2 a_y + z^2 a_z$ V/m in a medium whose $\epsilon_r = 2$. [6M]

(OR)

7. a) State the boundary conditions satisfied by electro-magnetic fields E and H at the interface of air and a perfect dielectric. [6M]

   b) The conduction current density in a lossy dielectric is given by $J_c = 0.02 \sin 10^9 t$ A/m^2. Find the displacement current density if $\sigma = 10^3$ mho/m and $\epsilon_r = 6.5$ [6M]

UNIT – IV

8. a) In a perfect dielectric medium the electric field progressing in the z-axis is given by the equation $E = E_o \cos(\omega t - \beta z) a_x$ and the associated magnetic field by the equation $H = \frac{E_o}{\eta} \cos(\omega t - \beta z) a_y$ Where E_o is the peak value of E at t=0 and Z=0 and η is the intrinsic impedance of the dielectric. Prove that the average power flowing through any area A normal to the z-axis is given by $P_{av} = \frac{1}{2} \frac{E_0^2}{\eta} . A$ watts/m^2. [8M]

   b) A plane wave travelling in free space has an average Poynting vector of 1.5 watts/m^2. Calculate the average energy density. [4M]

(OR)

9. a) The electric field intensity associated with a plane wave travelling in a perfect dielectric medium is given by $E_x(z,t) = 10 \cos(2\pi X 10^7 t - 0.1\pi x)$ V/m. Calculate the velocity of propagation. Write down an expression for the magnetic field intensity associated with the wave if $\mu = \mu_0$. [6M]

   b) Obtain the relationship between E and H in a uniform plane wave. [6M]

UNIT – V

10. a) Prove that a line of finite length and terminated by its characteristic impedance Z_0 is equivalent to a line of an infinite length. [6M]

    b) An open wire transmission line has R = 10 0hm per km, L = 0.0037 henry per km, C = 0.0083 X 10^{-6} farad per km and G = 0.4 X 10^{-6} ohms per km. Determine its Z_o, α, and β at 1KHz. [6M]

(OR)

11. a) Define input impedance of a transmission line. Derive an expression for input impedance of a transmission line in terms of reflection coefficient. [6M]

    b) A transmission line connects a transmitter of 1.2MHz to the antenna located 100m away from it. If Z_o of the line equals 500Ω, what is the input impedance of this line if antenna end
    (i) open circuited,
    (ii) short circuited. [6M]

***

AR13 SET-1

Code: 13CS2008

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, August-2015

COMPUTER ORGANIZATION AND ARCHITECTURE
(COMMON TO CSE & IT)

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

PART-A

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

1. a) What is Floating Point representation?
   b) What are different Error detection codes?
   c) What is bus arbitration?
   d) What is selective clear operation?
   e) What is Register Stack?
   f) Define Indirect Addressing Mode.
   g) Draw the block diagram of RAM.
   h) What is Cache Memory?
   i) Differentiate Isolated and Memory Mapped I/O.
   j) Define Strobe Signal.

PART B

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

UNIT 1

2. a). Explain different functional units in a basic computer. [7M]
   b). Explain in detail floating point representation. [5M]

(OR)

3. a) Design a 4- bit Arithmetic Circuit to perform all Arithmetic Operations.[7M]
   b) Explain various Shift micro operations. [5M]

UNIT II

4. Explain Booth's multiplication Algorithm with flowchart and example. [12M]

(OR)

5. a) Explain in detail General Register Organization. [6M]
   b) Explain Various Instruction Formats. [6M]

UNIT III

6. a) Write briefly about Memory Hierarchy. [5M]
   b) Explain about Associative Memory with its Hardware Organization [7M]

(OR)

7. Explain various mapping techniques in Cache Memory. [12M]

UNIT IV

8. a) Write short notes on I/O Interface. [5M]
   b) Explain Asynchronous data transfer. [7M]

(OR)

9. Explain Direct Memory Access in detail. [12M]

UNIT V

10. What is Multi-Processor? Explain different Interconnection Structures for Multi-Processor Systems. [12M]

(OR)

11. What is Pipelining? Explain instruction pipeline and Arithmetic Pipeline. [12M]

****