Code: 13CE2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July-2017
HYDRAULICS AND HYDRAULIC MACHINERY
(Civil Engineering)

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

PART-A

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

1. a) What are the limitations of Reyleigh's method of dimensional analysis?
   b) Write the dimensions of Chezy's constant C.
   c) What is the condition for most economical triangular section of open channel?
   d) Write the condition for critical flow in a rectangular open channel.
   e) Write an expression for force exerted by jet on stationary vertical plate?
   f) Give an example for axial flow hydraulic turbine.
   g) What is meant by governing of turbine?
   h) What is priming in case of centrifugal pump?
   i) How cavitation can be prevented in centrifugal pump?
   j) Define manometric head of centrifugal pump.

PART-B

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

UNIT-I

2. a) Write the dimensions for the following quantities (i) pressure intensity (ii) dynamic viscosity (iii) power (iv) surface tension [4M]

   b) Assuming that the rate of discharge Q of a centrifugal pump is dependent upon the mass density ρ of fluid, pump speed N, the diameter of impeller D, the pressure p and viscosity of fluid μ, show using the Buckingham's π-theorem that it can be represented by [8M]

$$Q = (ND^3)\phi\left[\left(\frac{p}{\rho N^2 D^2}\right),\left(\frac{\mu}{\rho N D^2}\right)\right]$$

(OR)

3. a) What is dimensional analysis? Explain the uses of it. [4M]
   b) Show that the velocity through a circular orifice is given by [8M]

$$V = \sqrt{2gH}\,\phi\left[\frac{D}{H},\frac{\mu}{\rho VH}\right]$$

Where V is the the velocity of flow through a circular orifice of diameter D under a head of H. ρ and μ are the density and viscosity of fluid.

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UNIT-II

4. a) Derive the expression for the condition of a most economical rectangular section of a open channel. [6M]

   b) A most efficient trapezoidal section is required to give a maximum discharge of 21.5 m^3/s of water. The slope of the channel bottom is 1 in 2500. Taking C=70 in chezy's equation, determine the dimensions of the channel. [6M]

(OR)

5. a) Derive the dynamic equation of gradually varied flow in open channel mentioning the assumptions made while deriving it. [6M]

   b) A horizontal rectangular channel 4 m wide carries a discharge of 16 m^3/s. Determine whether a jump may occur at an initial depth of 0.5 m or not. If a jump occurs, determine the sequent depth to this initial depth. Also determine the energy loss in the jump. [6M]

UNIT-III

6. a) Derive an expression for force exerted by jet on a series of flat plates mounted on a wheel when it striking at the centre. Also obtain the condition for maximum efficiency. [6M]

   b) A jet of water 75 mm diameter having a velocity of 20 m/s, strikes normally a float smooth plate. Determine the thrust and work done per second on the plate and efficiency of jet if the plate is moving the same direction as the jet with a velocity of 5 m/s. [6M]

(OR)

7. a) Show that the work done by the jet of water per second for a series of unsymmetrical curved vanes mounted radially in the periphery of a wheel the work done by the jet of water per second as $\frac{W}{g}(V_{w1}u_1 + V_{w2}u_2)$ [6M]

   b) A jet of water having a velocity of 45 m/s impinges without shock a series of vanes moving at 15 m/s, the direction of motion of the vanes being inclined at 20^0 to that of the jet. The relative velocity at outlet is 0.9 of that at inlet, and the absolute velocity of the water at exit is to be normal to motion of the vanes. Find: (a) vane angles at entrance and exit; (b) work done on vanes per unit weight of water supplied by the jet. [6M]

UNIT-IV

8. a) A Pelton wheel has a mean bucket speed of 12 m/s and is supplied with water at a rate of 750 litres per second under a head of 35 m. If the bucket deflects the jet through an anlge of 160^0, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. [6M]

   b) Define the following terms. (i) Unit speed (ii) unit power (iii) Specific speed [6M]

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(OR)

9. a) Explain the functions of main parts and working principle of Francis turbine with a neat sketch. [6M]

   b) A Francis turbine is running with the following data: Net head =68 m; Speed = 750 rpm; output power = 330 kW; Hydraulic efficiency = 94%; Overall efficiency = 85%; flow ratio = 0.15; Breadth ratio = 0.1; Outer diameter is twice the inner diameter. Also assume 6% of circumferential are of the runner to be occupied by the thickness of the vanes. Determine (i) guide blade angle (ii) vane angle at inlet (iii) diameter and width of wheel at inlet. [6M]

UNIT-V

10. a) Explain the performance characteristic curves of centrifugal pump. [4M]

    b) A centrifugal pump is to discharge 0.118 m^3/s at a speed of 1450 rpm against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. [8M]

(OR)

11. a) Derive the expression for specific speed of centrifugal pump. [4M]

    b) A pump operates at a maximum efficiency of 82% and delivers 2.25 m^3/s under a head of 18 m while running at 3600 rpm speed. Compute the specific speed of the pump. Also determine the discharge, head and power input to pump at shaft speed of 2400 rpm assuming the efficiency remains same. [8M]

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AR13

CODE: 13EE2011 **SET-II**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July-2017
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 are the major losses exist in transformer?
   b) Write any two differences between core & shell type transformer?
   c) What is the condition for maximum efficiency in a single phase transformer?
   d) What is the disadvantage of Scott connection?
   e) In case of an 8-pole induction motor the supply frequency was 50Hz then its synchronous speed will be?
   f) What is speed of RMF in induction motor?
   g) What are the constructional types of induction motors?
   h) Name the methods in which starting methods of inductor motor voltage reduced mechanism is applied.
   i) Name the methods for controlling the speed of induction motor from the rotor side.
   j) What are the tests to be conducted to draw the circle diagram of induction motor.

PART-B

Answer one question from each unit [5x12=60M]

UNIT-I

2. a) A 15 KVA 2400/240 V, 60 Hz transformer has a magnetic core of 50-cm^2 cross section and a mean length of 66.7 cm. The application of 2400V causes magnetic field intensity of 450 AT/m (RMS) and a maximum flux density of 1.5 T. Determine (i) Turn's ratio (ii) Number of turns in each winding (iii) magnetizing current [6M]
   b) Draw the equivalent circuit of transformer [6M]

(OR)

3. a) Obtain the conditions for maximum efficiency of transformer. [6M]
   b) Explain the constructional details of transformer [6M]

UNIT-II

4. a) What are the tests to be conducted on transformer to find its copper & iron losses? [8M]
   b) What are the conditions to be satisfied for parallel operation of transformers? [4M]

(OR)

5. a) Explain Scott connection with the help of vector diagram. And also write the applications of scott connected transformer. [7M]

   b) A Delta/star, 3Φ, 500 KVA , 33KV/11KV, 50 Hz transformer has core losses of 3050W, Primary winding resistance/phase of 35Ω ,secondary winding resistance of 1.5Ω. Calculate the efficiency of the transformer at full load, half full load, unity p.f. and 0.8 p.f. lag. [5M]

UNIT-III

6. a) Explain the classification of induction motors based on its construction of rotor. Explain the advantages & disadvantages of each. [8M]

b) A three phase, 400 V Induction motor has transformation ratio of 6(stator to rotor). The rotor has per phase resistance & reactance of 0.5Ω & 1.5Ω respectively. Calculate rotor current and power factor when (i) slip rings are short circuited with the slip of 5% (ii) External resistance of 1Ω/ph is connected in rotor circuit and motor is rotating with 8% slip. [4M]

(OR)

7. a) Derive the torque developed by three phase induction motor starting from fundamentals. Also obtain the expressions for starting & maximum torque. [6M]

b) A three phase, 4- pole, 50 Hz induction motor has rotor resistance and standstill reactance of 0.03Ω and 0.12 Ω per phase respectively. Find (i) speed at which maximum torque occurs (ii) External resistance per phase to be inserted to obtain 75% of maximum torque at starting. [6M]

UNIT-IV

8. Draw the circle diagram for 3-phase, 6-pole, 50HZ, 400V, star connected induction motor from the following data (line values) [12M]

No-load test: 400V, 9A, 1250W

Short circuit test: 150V, 38A, 4000W

The rotor copper loss at standstill is half of the total copper losses and full load current is 30A.From the circle diagram determine:

(i) Power factor (ii) slip (iii) output (iv) efficiency (v) Speed

(OR)

9. a) With the help of wiring diagram explain briefly star- delta starter of three phase induction motor. [7M]

b) A 3Φ, 15HP, 6 pole, 50 Hz, 400V delta connected induction motor runs at 960 RPM on full load. If it takes 86.4 A on direct starting, find the ratio of starting torque to full load torque with a stat-delta starter. Full load efficiency is 88% and p.f.=0.85. [5M]

UNIT-V

10. a) Explain variation of frequency control method for speed control of three-phase induction motor. [6M]

b) A 440V, 50 Hz, 4 pole,1460 RPM, star connected cage induction motor has $R_S=2\Omega$, $R_r^1=2\Omega$, $X_S=X_r^1=3\Omega$. Calculate starting torque and starting current of this motor at 50 Hz and 10 Hz for v/f control. [6M]

(OR)

11. a) What are the various methods of speed control on stator side of a three induction motor. [7M]

b) Explain the principle of operation of three phase induction generator [5M]

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AR13 SET2

CODE: 13ME2010

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July-2017

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) Write a short note on the significance of Factor of Safety
   b) Define stress concentration and explain its role in failure of machine components
   c) Mention any two types of permanent and temporary fastenings
   d) Classify welded joints
   e) What do you mean by BIS. Identify its functions.
   f) Indicate an expression that evaluates thickness of a cylinder using Lame's equation.
   g) Mention the major applications of knuckle joint
   h) Identify the types of stresses induced in shafts
   i) Explain the significance of flexible coupling
   j) What is the function of a springas a machine component

PART-B

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

UNIT-I

2. a) Derive a relation for the shear stress developed in a shaft , when it is subjected to torsion **[6M]**

   b) A steel shaft of 50 mm diameter and 500 mm long is subjected to a twisting moment of 1100 N-m, The total angle of twist is 0.6^0. Find the maximum shearing stress developed in the shaft and the modulus of rigidity. **[6M]**

(OR)

3. a) Define the following: (i) Fatigue stress concentration factor (ii) Notch sensitivity **[4M]**
   b) A 50 mm diameter shaft is made from carbon steel having ultimate tensile strength of 630 M Pa. It is subjected to a torque which fluctuates between 2000 N-m to -800 N-m. Using Soderberg method, calculate the factor of safety. Assume suitable values for any other data needed. **[8M]**

UNIT-II

4. Design a longitudinal joint for a 1.25 m diameter steam boiler to carry a steam pressure of 2.5 N/mm^2. The ultimate strength of the boiler plate may be assumed as 420 M Pa, crushing strength as 650 M Pa and shear strength as 300 MPa. Take the joint efficiency as 80%. Sketch the joint with all the dimensions. Adopt suitable factor of safety. **[12M]**

CODE: 13ME2010

(OR)

5. a) What is an eccentric loaded weld joint? Discuss the procedure for designing such ajoint. **[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 eccentric load of 4000 N, the line of action of which has a distance of 1.5 m from the center 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]**

UNIT-III

6. Determine the safe tensile load for the bolts of M 20 and M 36. Assume that the bolts are not initially stressed and take the safe tensile stress as 200 MPa. **[12M]**

(OR)

7. a) Compare the difference between Hoop stresses and longitudinal stressesin thin cylindrical shellswith neat sketches and design formulae, when subjected to internal pressure? **[6M]**

b) A thick cylindrical shell of internal diameter 150 mm has to withstand an internal fluid pressure of 50 N/mm^2. Determine its thickness so that the maximum stress in the section does not exceed 150 MPa. **[6M]**

UNIT-IV

8. Design a knuckle joint to connect two mild steel bars under a tensile load of 25 kN. The allowable stresses are 65 MPa in tension,50 MPa in shear and 83 MPa in crushing. **[12M]**

(OR)

9. Determine the diameter of hollow shaft having inside diameter 0.5 times the outside diameter. The permissible shear stress is limited to 200 MPa. The shaft carries a 900 mm diameter cast iron pulley. The pulley is driven by another pulley mounted on the shaft placed below it. The belt ends are parallel and vertical. The ratio of the tensions in the belt is 3. The pulley on the hollow shaft weighs 800 N and overhangs the nearest bearing by 250 mm. The pulley is to transmit 35 kW at 400 rpm. **[12M]**

UNIT-V

10. Two 35 mm shafts are connected by a flanged coupling. The flanges are fitted with 6 bolts on 125 mm bolt circle. The shafts transmit a torque of 800 N-m at 350 rpm. Calculate (i) diameter of the bolts, (ii) thickness of the flanges, (iii) key and hub dimensions (iv) power transmitted, when the safe shear stress for shaft material=63 MPa, safe stress for bolt material=56 MPa, safe stress for cast iron coupling=10 MPa, and safe stress for key material=46MPa. **[12M]**

(OR)

11. a) Define the following with respect to springs: (i)Spring Index(ii) Solid length (iii)Pitch(iv) Stiffness. **[4M]**

b) A Helical spring is made of a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 M Pa and modulus of rigidity is 84 kN/mm^2, Find the axial loadwhen (i) Neglecting the effect of curvature, (ii) considering the effect of curvature. **[8M]**

AR13 SET-2

Code: 13EC2011

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July-2017

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) State Coulomb's law of force between any two point charges.
   b) If there exists a total charge of 12nC in a spherical volume of $0.1m^3$, find the volume charge density.
   c) State ampere's circuit law?
   d) State Biot-Savart's law.
   e) Write the Maxwell's equations in phasor form.
   f) What is the value of Intrinsic impedance for free space.
   g) Define Uniform Plane wave.
   h) Define Brewster angle.
   i) What is the condition for distortion less transmission line?
   j) Give the relationship between VSWR, Z_L and Z_o.

PART – B

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

UNIT – I

2. a) Derive an expression for the capacitance of a parallel plate capacitor. [6M]
   b) A sphere of volume $0.1m^3$ has a charge density of $8.0pC/m^3$. Find the electric field at a point (2,0,0) if the centre of the sphere is at (0,0,0) [6M]

(OR)

3. a) Derive the equation for energy density in an electrostatic field. [8M]
   b) What is the electric flux density and electric field intensity at a distance of 20cms due to an isolated point charge of 20×10^{-12} Coulombs [4M]

UNIT – II

4. a) Obtain the boundary conditions for electromagnetic fields at the interface of two dielectrics. [6M]
   b) A current element 4cm long is along y-axis with a current of 10mA flowing in y-direction. Determine the force on the current element due to the magnetic field if the magnetic field $H = \frac{5a_x}{\mu}$ A/m [6M]

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(OR)

5. a) Derive the expression for the magnetic field intensity due to infinitely long straight conductor. [6M]

   b) A circular current element of radius 2.0cm is in a magnetic flux density of 10wb/m^2. If the plane of the element is perpendicular to the field, determine the total current in the element [6M]

UNIT – III

6. a) Write the Maxwell's equations in integral & point forms with their word statements [6M]

   b) Derive the equation of continuity for time varying fields. [6M]

(OR)

7. a) Explain the inconsistency of Ampere's law for time varying fields. [6M]

   b) In a material for which σ=4.5 mho/m , ϵ_r=1 and the electric field intensity E=300sin10^{9}t a_x V/m. Find the frequency at which the conduction current and displacement current density have equal magnitude. [6M]

UNIT – IV

8. a) Define Skin depth and Derive the expression for skin depth for a good conductor [6M]

   b) Find the depth of penetration, δ of an EM wave in copper at f = 60 Hz and f = 100MHz. For copper, σ = 5.8 X 10^7 mho/m, μ_r = 1 and ϵ_r = 1. [6M]

(OR)

9. a) Explain wave propagation in a lossy dielectric medium. [6M]

   b) A plane wave travelling in a medium of $\epsilon_r = 1, \mu_r = 1$ has an electric field intensity of E = 100X$\sqrt{\pi}$ V/m. Determine the energy density in the magnetic field [6M]

UNIT – V

10. a) Derive the expressions for the input impedance of loss-free line of length l when the load end
    (i) short circuited and
    (ii) open circuited [6M]

    b) In a transmission line the VSWR is given by 2.5. The characteristic impedance is 50Ω and the line is to transmit a power of 25W. Determine the magnitudes of the maximum and minimum voltage. [6M]

(OR)

11. a) Derive an expression for the input impedance of a transmission line of length l and characteristic impedance Z_o terminated in a load impedance of Z_L? [6M]

    b) A transmission line which has no distortion is present has the following parameters Z_0=50Ω, $\alpha = 0.020m^{-1}$ and $v = 0.6v_0$. Determine R, L, G, C and wavelength at 0.1GHz. [6M]

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AR13

CODE: 13CS2008 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July-2017

COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to CSE & IT)

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

PART-A

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

1. a) What is floating point number representation?
   b) Draw common bus system of registers.
   c) Explain addition & subtraction algorithm of sign magnitude.
   d) List the addressing modes.
   e) What is the structure of control memory?
   f) Draw DMA interface.
   g) What are levels of memory hierarchy?
   h) What is interrupt initiated I/O
   i) List the trends in computer architecture.
   j) Explain instruction pipeline.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. Explain CPU organization with its internal registers. **12**

(OR)

3. Convert the following number systems **12**
   i) $(26589)_{10} = (?)_2$
   ii) $(65732)_8 = (?)_{16}$
   iii) $(BA59FC)_{16} = (?)_{10}$
   iv) $(72166)_{10} = (?)_8 = (?)_2$

UNIT-II

4. a) Explain the instruction cycle with flowchart. **6**
   b) Explain about instruction types. **6**

(OR)

5. a) Explain briefly decimal arithmetic unit. **6**
   b) Explain the data transfer instructions. **6**

UNIT-III

6. Explain Cache memory organization with different mapping techniques. **12**

(OR)

7. a) Explain the following **6**
      i) Optical disks ii) Magnetic Tape
   b) Explain about Virtual Memory. **6**

AR13

CODE: 13CS2008 SET-1

UNIT-IV

8.		**Explain Asynchronous data transfer with its interface unit**	**12**
		(OR)	
9.		**Explain about Direct Memory Access in detail.**	**12**

UNIT-V

10.	**a)**	**Write about Arithmetic Pipeline.**	**6**
	b)	**Explain about RISC computer architecture.**	**6**
		(OR)	
11.	**a)**	**What are pipeline hazards? Explain.**	**6**
	b)	**Explain how the effects of hazards are reduced.**	**6**

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