Code : 1G536 **R11**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Supplementary Examinations, June 2014

Fluid Mechanics and Hydraulic Machines

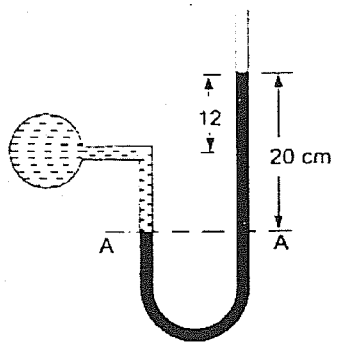
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

1. a) Define the following terms (i) Specific gravity of a fluid (ii) Specific weight 4M
   b) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of specific gravty 0.9 is flowing. The center of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.



10M

2. a) Explain the terms (a) Path line (b) Stream line (c) streak line 6M
   b) A stream function is given by $\varphi = 5x - 6y$. Calculate the velocity components and also magnitude and direction of the resultant velocity at any point 8M
3. a) Define Vena-contracta. 2M
   b) A 25 mm diameter nozzle discharges 0.76 m^3 of water per minute when the head is 60m. the diameter of the jet is 22.5mm. Determine (i) the values of coefficients C_0,C_v and C_d and (ii) the loss of head due to fluid resistance. 12M
4. a) Given the applications of Jets and Jet propulsions 2M
   b) Show that the force exerted by a jet of water on an inclined fixed plate in the direction of the jet is given by

$$F_w = \rho a v^2 \sin^2\theta$$

   Where a = Area of the jet, V = velocity of the jet and θ inclination of the plate with the jet. 12M
5. a) Explain the concept of pump storage plants. Enumerate the merits and demerits 6M
   b) What are the different types of hydro electric power stations? Explain in brief. 8M
6. a) Give the classification of Hydraulic turbines. 6M
   b) Differentiate between Impulse and Reaction turbine 8M
7. A Pelton turbine develops 3000kW under a head of 300m. The overall efficiency of the turbine is 83% if speed ratio = 0.46, C_v = 0.98 and specific speed is 16.5, then find (i) Diameter of the turbine and (ii) diameter of the jet. 14M
8. a) A centrifugal pump is to discharge 0.118 m^3/sec at a speed of 1450 rpm against a head of 25m. The impeller diameter is 25cm, its width at outlet is 5cm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. 10M
   b) Draw the characteristics curves for the Centrifugal pump. 4M

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Code : 1G231 **R11**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Supplementary Examinations, June/July 2014

Switching Theory and Logic Design

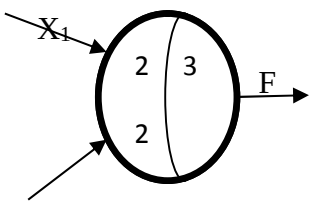
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

1. a) What is a weighted code? Distinguish between BCD and 2421 codes? 7M
   b) Convert $(1023222)_4$ to base 16 ? 2M
   c) Explain the process of Error detection in ASCII coded data? Why ASCII CODE length is 7 bits only? 5M
2. a) Prove that AB+A'C = (A+C) (A'+B) 3M
   b) Reduce the following function to output function of 4 literals : (A'+C')(A'+C) (A+B+CD) 5M
   c) Realize the function F=∑m(0,3,4,5,7) to minimum two level SOP using NAND gates 6M
3. a) Realize the following expression using K-map F=π M(0,1,2,4,5,6,9,11,12,13,14,15) and Implement the same using NOR logic. 10M
   b) What is K-map? State advantages and limitations of K-map? 4M
4. a) Design a combinational circuit controlled by three variables, where the circuit is active for either of following conditions
      i. When first variable is active along with others.
      ii. Only when second variable is active.
      iii. When first variable active along with at least one other variable active 8M
   b) Design 3*8 decoder using NAND logic? 6M
5. a) What is PAL ? Explain the internal structure of PAL? 5M
   b) What are the limitations of threshold logic gate? 3M
   c) Determine the switching function of the threshold element shown below



X_2 6M

6. a) Explain about SR and JK flip-flops in detail? 7M

   b) Design twisted ring counter using D-flip flop? 7M

7. a) Explain the procedure of state minimization using partition technique? 6M

   b) What are the conditions for two machines to be equivalent? 2M

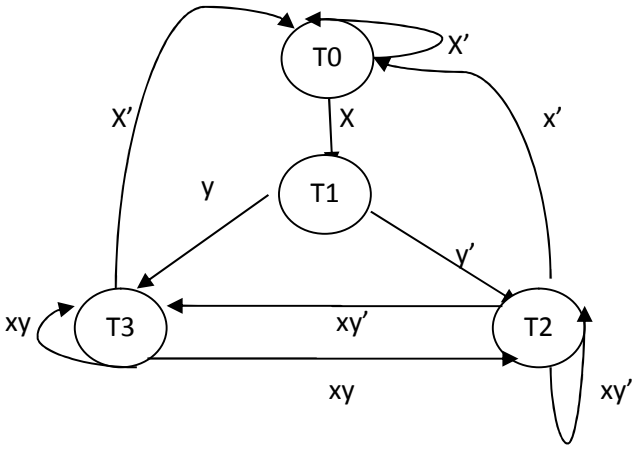
   c) Find the equivalence partition and corresponding reduced machine in standard form for below table

Present state	Next state	Z
A	F,0	B,1
B	G,0	A,1
C	B,0	C,1
D	C,0	B,1
E	D,0	A,1
F	E,1	F,1
G	E,1	G,1

6M

8. a) What is an ASM chart? 4M

   b) Design ASM chart for below state diagram?



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Code : 1G233

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Electrical Circuits-I

(Electrical & Electronics Engineering)

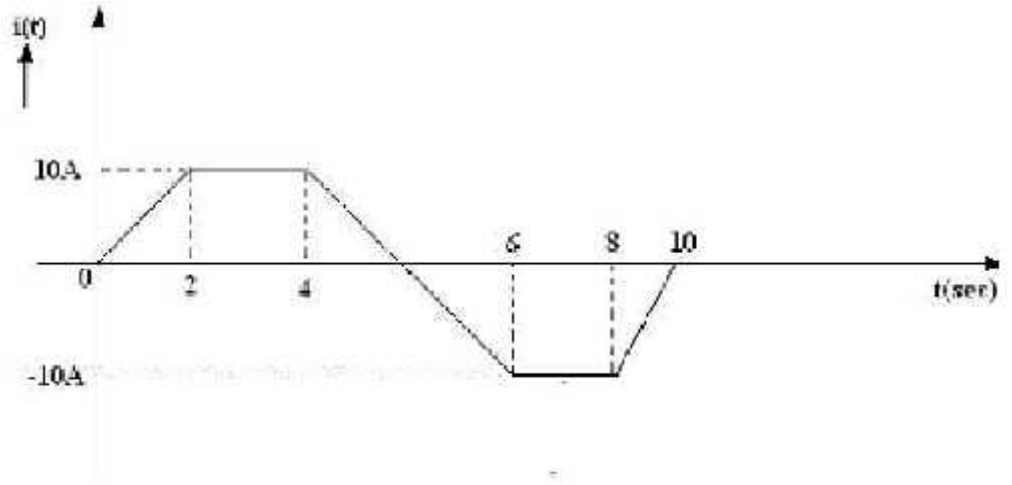
Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

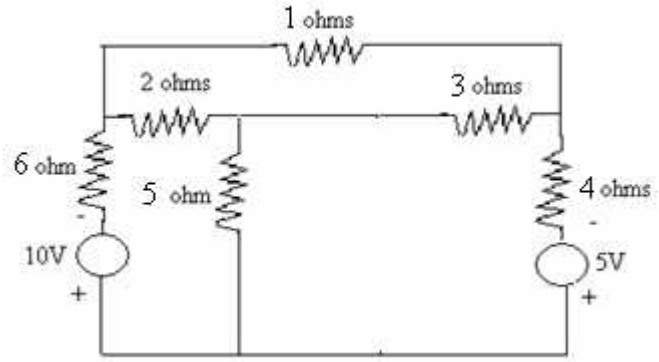
1. a) Explain Active elements in detail. **7M**

   b) A pure inductance of 3 mH carries a current of the wave form shown in figure. Sketch the waveform of V(t) and P(t). Determine the average value of power. **7M**



2. a) Define Node, Super node, Path, Loop and Branch **5M**

   b) By using loop analysis find the current flowing through 5 ohms resistor. **9M**



3. a) Derive the expression for Average value of alternating voltage wave $V = V_m \sin \omega t$. **7M**

   b) Define Cycle, Time period, Frequency, Amplitude, Average value, Form factor and Peak factor. **7M**

4. a) Obtain the current locus of a series circuit having a fixed resistance and a variable inductance. **7M**

   b) Given a series RLC circuit with R = 100 ohms, L = 0.5 H and C = 40 μF, Calculate the resonant, lower and upper half – power frequencies. **7M**

5. a) Derive the relation between Phase and Line values of a balanced three phase delta connected system with neat circuit diagram. **7M**

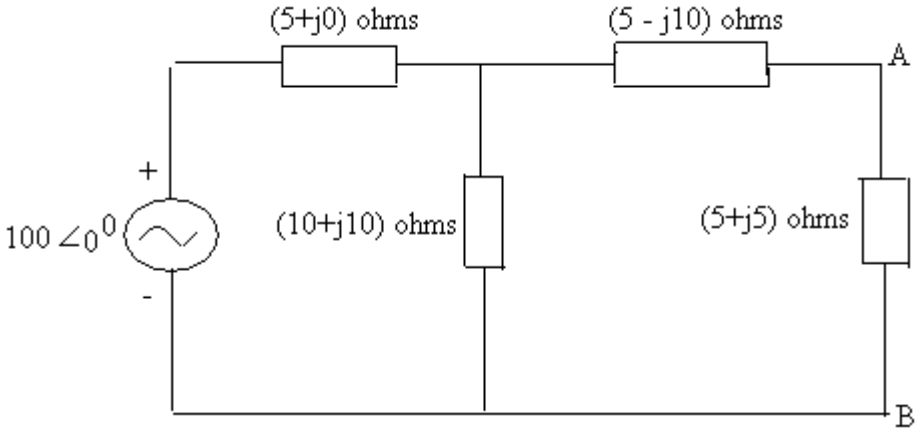
   b) Explain the power measurement in three phase systems using two wattmeter method with neat circuit diagram. **7M**

6. a) Define and explain self – inductance and mutual – inductance. Derive the formulae for Coefficient of coupling. **7M**

   b) An iron ring of mean circumference of 1 m is uniformly wound with 400 turns of wire. When a current of 1.2 A is passed through the coil, a flux density of 1.15 Wb/m^2 is produced in the iron. Find the relative permeability of the iron under these circumstances. **7M**

7. a) State and explain Maximum power transfer theorem for AC network. **7M**

   b) By using Norton's theorem find the current flowing through (5+j5) ohms impedance **7M**



8. a) State and explain Tellegens theorem. **7M**

   b) State and explain Substitution theorem and write down some applications. **7M**

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Code : 1G232

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Electrical Machines-I

(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following

All questions carry equal marks (14 Marks each)

* * * * *

1. a) Explain the energy flow in electromechanical energy conversion devices. 7M

   b) Derive an expression for torque in case of a multi excited magnetic field system 7M

2. a) What is an equalizer connection? What is necessity of equalizer connection? 6M

   b) An 8 pole DC generator has per pole flux of 30mWb and winding is connected in lap with 960 conductors. Calculate the generated EMF on open circuit when it runs at 500 rpm. If the armature is wave wound at what speed must the machine be driven to generate the same voltage. 8M

3. The OCC of dc generator at 1000 rpm is as given in Table.

   The machine is connected as shunt generator at 1000 rpm. The resistance of shunt field circuit is 50 ohms. Calculate:

Field current I_f in Amps	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Voltage V_g in Volts	60	120	138	145	149	151	152

   (a) The open circuit voltage

   (b) The critical value of field resistance

   (c) The terminal voltage when the load has a resistance of 4.0 ohms

   (d) The load current when the terminal voltage is 100 V. Take R*a* = 0.1 and neglect Armature reaction. 14M

4. a) Explain the Armature reaction and commutation in detail 6M

   b) A 4-pole lap wound d. c. generator delivers a full load current of 450 A. It has shunt field current of 12 A and 123 commutator segments in the commutator ring of the machine. If the brushes are advanced by 3 commutator segments on full load,

   find (a) The demagnetizing AT/pole;

   (b) The cross-magnetizing AT/pole. 8M

5. What is parallel operation? How do you connect the two shunt generators in parallel? Explain briefly? (3+3+8)M

6. a) Explain with neat sketch construction and working principle of DC Motor. 7M

   b) A 6-pole DC motor has a wave connected armature with 87 slots, each slot containing 6 conductors. The flux per pole is 20 m.wb and the armature has a resistance of 0.12 ohm when the motor is connected to 230V supply and the armature draws a current of 80A driving a load of 15KW.

   Calculate

   i. Speed

   ii. Armature Torque and

   iii. shaft Torque. 7M

7. a) Explain the Ward-Leonard system of controlling speed of a DC shunt motor with the help of neat diagram? 7M

   b) A DC shunt motor is running at certain speed. Discuss the effect on the speed of this motor, if its

   i. Line voltage is reduced to half.

   ii. Armature voltage is reduced to half keeping field voltage constant

   iii. Armature voltage kept constant and field voltage reduced to half.

   iv. Armature voltage doubled and field voltage halved. 7M

8. a) How are large series machines tested, explain? 4M

   b) The Hopkinson's test on two DC shunt machines gave the following results for full load. Line voltage 250V, line current 50A excluding field currents; motor armature current 380A; field current 5A and 4.2A. Calculate the efficiency of each machine. Armature resistance of each machine is 0.025 ohms. 10M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Electromagnetic Fields

(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

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1. a) State and explain Coulomb's law in electro statics. 7M
   b) State and explain Maxwell's first equation in Integral form. 7M
2. a) Show that the torque on a physical dipole $\overline{p}$ C – m in a uniform electric field $\overline{E}$ is given by $\overline{T} = \overline{P} \times \overline{E}$. Extend the result to a pure dipole. 7M
   b) Find the potential 'V' at the point (2, 3, 4) for the field of two co – axial conducting cylinders, Given V = 60 V at ρ = 3 m and V = 10 V at ρ = 5 m 7M
3. a) Derive Poission's equation from fundamentals. 7M
   b) State and explain Ohm's law in point form. 7M
4. a) Derive magnetic field intensity due to a square current carrying element. 7M
   b) A uniform solenoid 100 mm in diameter and 400 mm long has 100 turns of wire and a current of I = 3A. Find the magnetic field on the axis of the solenoid (a) at the centre (b) at one end and (c) half way from the centre to one end. 7M
5. a) Derive the Maxwell's third equation ∇ x H = J. 7M
   b) State and explain Ampere's circuital law? Describe any two applications of Ampere's circuital law. 7M
6. a) State and explain Lorentz force equation. 7M
   b) A single-phase circuit comprises two parallel conductors A and B, each 0.5 cm diameter and spaced 0.5 m apart. The conductors carry current of 75 A and -75 A respectively. Determine the field intensity at the surface of each conductor and also in space exactly midway between A and B. 7M
7. a) Make analogy between Electric and Magnetic circuits. 7M
   b) An iron ring has a mean circumference of 125 cm cross sectional area of 10 cm^2. It is wound with 500 turns of wire when it carries 1.5 A, the flux produced is 1 mWb. What is the relative permeability of the iron material and what is the inductance of the system? If a length of 1 mm is removed from the iron ring, what is the new value of inductance of the system? 7M
8. a) Explain faraday's laws of electromagnetic induction and derive the expression for induced emf. 7M
   b) A square coil rotates at a constant speed of 500 rpm about an axis perpendicular to a stationary uniform field of magnetic induction 0.75 Tesla. The coil has mean dimension of 15 cm x 15 cm and is wound with 100 turns. Determine dynamically induced emf in the coil when the plane of the coil is (i) In the same plane as the field (ii) At right angles to the field (iii) Inclined 60^0 to the field 7M

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Code : 1GC32 **R11**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Engineering Mathematics

(Common to EEE & ECE)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

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1. a) Solve the system x+y+z=6 , x+2y+2z=14, x+4y+7z=30.

   b) Reduce A to normal form and find its rank of $A=\begin{pmatrix}1 & 2 & 3 & 4\\ 2 & 1 & 4 & 3\\ 3 & 0 & 5 & -10\end{pmatrix}$

2. Solve $y'=y^2+x, y(0)=1$. Using Taylor's series method ,compute y(0.1),y(0..2) and y(0.3)

3. Using R-K method of 4th order ,solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$,y(0)=1.Find y(0.2) and y(0.4).

4. a) Fit a straight line to the following data

Year x	1961	1971	1981	1991	2001
Production y	8	10	12	10	16

   And find expected production in 2006.

   b) Find the curve of best fit of the form $y=ae^{bx}$ to the following data by the method of least squares

x	1	5	7	9	12
y	10	15	5	15	21

5. a) Eliminating the arbitrary functions ϕ_1 and ϕ_2 from $z=\phi_1(x+iy)+\phi_2(x-iy)$.

   b) Obtain the partial differential equation arising from $\phi(x+y+z, x^2+y^2+z^2)=0$

6. a) Find the Fourier series to represents f(x)=$|x|$ *when* $-\pi<x<\pi$ and deduce that

$$\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots\ldots=\frac{\pi^2}{8}.$$

   b) Find the half range sin series for the function f(x)=x , *when* $0<x<\pi$

7. a) Find Fourier sin and cosine transform of f(x)=$\frac{e^{-ax}}{x}$

   b) Find finite Fourier sin and cosine transform of f(x)=2x when *when* $0<x<2\pi$

8. a) Find the maximum n such that the probability of getting no head in tossing in fair coin in n times is greater than 0.1.

   b) In a normal distribution 31% of the item are under 45 and 8% are over 64 .Find the mean and variance of the distribution.