Hall Ticket Number :										

R-11/R-13

Code: 1G536

II B.Tech. I Semester Supplementary Examinations November 2016

Fluid Mechanics and Hydraulic Machines

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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1. a) Explain how vacuum pressure can be measured with the help of U-tube manometer. 4M

   b) A U-tube containing mercury has its right limb open to atmosphere. The left limb is full of water and is connected to a pipe containing water under pressure, the center of which is in level with the free surface of mercury. Find the pressure of water in the pipe above atmosphere, if the difference of mercury level in the limbs is 5.08 cm. 10M

2. a) Determine and distinguish between (**i**) steady and unsteady flow (**ii**) uniform and non-uniform flow (**iii**) rotational and irrotational flow. 6M

   b) An incompressible fluid flows steadily through two pipes of diameter 0.15 m and 0.2 m, which combine to discharge in a pipe of 0.3 m diameter. If the average velocities in the 0.15 m and 0.2 m diameter pipes are 2 m/s and 3 m/s respectively, find the average velocity in the 0.3 m diameter pipe. 8M

3. a) What is a compound pipe? How would you determine the equivalent size of a compound pipe? 6M

   b) Two reservoirs are connected by three pipes laid in parallel, their diameters are *d, 2d,* and *3d* respectively, and they are of same length L. Assuming *f* to be the same for all pipes, determine the discharge through each of the larger pipes if the smallest pipe is discharging 1 cumec. 8M

4. a) A jet of water moving at 20 m/s impinges on a symmetrical curved vane shaped to deflect the jet through 120^o (that is the vane angles θ and ϕ are each equal to 30^o). If the vane is moving at 5 m/s, find the angle of the jet so that there is no shock at inlet. Also determine the absolute velocity of exit in magnitude and direction, and work done. 14M

5. a) What is a 'mass curve'? Explain the procedure for preparing a mass curve and also its uses. 8M

   b) What do you understand by pumped storage type of power station? What are its merits and demerits? 6M

6. A reaction turbine works at 450 r.p.m under a head of 120 m. Its diameter at inlet is 1.2 m and the flow area is $0.4m^2$. The angles made by the absolute and relative velocities at inlet are 20^o and 60^o respectively with the tangential velocity. Determine the volume flow rate, the power developed and the hydraulic efficiency. Assume whirl at outlet to be zero. 14M

7. The following data were obtained from the main characteristics of a Kaplan turbine of runner diameter 1 m: P_u = 30.695; Q_u = 108.6; N_u = 63.6. Estimate the runner diameter, the discharge and speed of a similar runner working under a head of 30 m and developing 2000 kW. Determine the specific speed of the runner. 14M

8. A single acting reciprocating pump has a piston of diameter 150 mm and stroke of length 250 mm. The piston makes 50 double strokes per minute. The suction and delivery heads are 5 m and 15 m respectively. Find (i) discharge capacity of the pump in liters per minute; (ii) force required to work the piston during the suction and delivery strokes if the efficiency of suction and delivery strokes are 60% and 75% respectively; and (iii) power required to operate the pump. 14M

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Hall Ticket Number :										

R-11/R-13

Code: 1GC32

II B.Tech. I Semester Supplementary Examinations November 2016

Engineering Mathematics

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any* ***five*** questions
All questions carry equal marks (14 Marks each)
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1. a) Solve the following system of equations by Gauss elimination method $2x_1+2x_2+4x_3=18$, $x_1+3x_2+2x_3=13$, $3x_1+x_2+3x_3=14$. 10M

   b) Given the matrix $A=\begin{pmatrix}1 & 7 & 5\\ 0 & 2 & 9\\ 0 & 0 & 5\end{pmatrix}$, find the Eigen values of A, A^2, A^{-1}. 4M

2. Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ given $y(0)=1$ at $x=0.2, 0.4$. 14M

3. a) Fit a straight line for the following data

x	1	2	3	4	5	6
y	6	4	3	5	4	2

   7M

   b) Calculate correlation coefficient 'r' for the following data

x	50	60	70	90	100
y	65	51	40	26	8

   7M

4. a) Form a partial differential equation by eliminating the arbitrary function 'f' from $z=f(x^2+y^2)$. 7M

   b) Solve the partial differential equation $pxy+pq+qy=yz$ using Charpit's method. 7M

5. a) Obtain the Fourier series for $f(x)=\left(\frac{® - x}{2}\right)^2 in\ 0<x<2®$. 7M

   b) Find the half-range sine series for $f(x)=x(® - x)$ in $(0,®)$ and deduce $\frac{1}{1^3}-\frac{1}{3^3}+\frac{1}{5^3}-\frac{1}{7^3}+\ldots$ 7M

6. Find the Fourier transform of $f(x)=\begin{cases}1-x^2 & if\ |x|\le 1\\ 0 & if\ |x|>1\end{cases}$. Hence prove that $\int_0^{\infty}\frac{\sin s - s\cos s}{s^3}\cos\left(\frac{s}{2}\right)ds=\frac{3®}{16}$. 14M

7. a) From the following data of the marks obtained by 60 students of a class, calculate the arithmetic mean, median and mode.

Marks	20	30	40	50	60	70
No. of students	8	12	20	10	6	4

   7M

   b) A random variable x has the following probability function:

x	0	1	2	3	4	5	6	7
y	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

   (i) Find the value of 'K'
   (ii) Evaluate P(X<6),P(X≥6)
   (iii) Evaluate P(0<X<5) 7M

8. a) The mean and variance of a binomial variable X with parameters n and p are 16 and 8.Find P(X≥1) and P(X>2). 7M

   b) In a Normal distribution, 7% of the items are under 35 and 89% are under 63.Determine the mean and variance of the distribution. 7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G231

II B.Tech. I Semester Supplementary Examinations November 2016

Switching Theory and Logic Design

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any ***five*** questions

All Questions carry equal marks (14 Marks each)

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1. a) Represent +25 and -25 in sign-magnitude, sign-1's complement and sign-2's complement representation 5M
   b) Explain error detection codes. 5M
   c) Construct even parity 7 bit hamming code for the message 0100. 4M
2. a) What are universal gates? Realize AND, OR, NOT, XOR gates using universal gates. 5M
   b) Simplify the following Boolean functions to a minimum number of literals:
      (i) x + x'y
      (ii) x (x' +y)
      (iii) x'y'z + x'yz + xy'
      (iv) xy + x'z +yz. 5M
   c) Prove that AND-OR network is equivalent to NAND-NAND network 4M
3. a) Simplify the following Boolean function for minimal SOP form using K-map.
      F (W, X, Y, Z) = Σ (0, 1, 2, 3, 4, 6, 8, 9, 10, 11) 7M
   b) Simplify the following Boolean functions using K-map.
      (i) F (A, B, C) = A'B + B'C + A'B'C'
      (ii) F (A, B, C) = A'B' + AC' + B'C + A'BC' 7M
4. a) Design 4x16 decoder using two 3x8 decoders with block diagram. 7M
   b) What is meant by Hazards? Explain the different types of Hazards. Obtain Hazard free realization circuit for the function: f (A, B, C, D) = Σm (0, 2, 6, 7, 8, 10, 12). 7M
5. a) Design a combinational circuit using PROM that converts a 3-bit binary number to equivalent excess-3 code. 7M
   b) Explain the general combinational PLD configuration with suitable block diagram. 7M
6. a) Show how mod-12 JK counter could be built using mod-3 & mod-4 counters. 7M
   b) Design a sequential circuit with two D-Flip-Flops A and B and one input x. When x=0, the state of the circuit remains the same. When x=1, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00 and repeats. 7M
7. a) Discuss mealy and Moore machine models of sequential machines 7M
   b) Explain the minimization procedure for determining the set of equivalent state of a specified machine M. 7M
8. a) Explain the salient features of the ASM chart. 7M
   b) Draw an ASM chart and state diagram for the synchronous circuit having the following description:" The circuit has a control input 'x', clock and outputs A and B. If x = 1, on every clock edge (rising of falling) the code on BA changes from **00** ì **01** ì **10** ì **11** ì **00** and repeats. If x = 0, the circuit holds the present state". 7M

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Hall Ticket Number :										

R-11/R-13

Code: 1G232

II B.Tech. I Semester Supplementary Examinations November 2016

Electrical Machines-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any* ***five*** questions
All questions carry equal marks (**14 Marks** each)
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1. Derive an expression for co-energy density of an electromechanical energy conversion device. 14M

2. a) Derive an equation for the EMF of DC generator. 7M
   b) A 6-pole DC generator has 150 slots. Each slot has 8 conductors and each conductor has resistance of 0.01Ω. The armature terminal current is 15 A. Calculate the current per conductor and the drop in armature for Lap and Wave winding connections. 7M

3. Draw the performance characteristics of different types of DC generators and explain them. 14M

4. a) Two separately-excited DC generators are connected in parallel and supply a load of 200 A. the machines have armature circuit resistances of 0.05Ω and 0.1Ω and induced EMF's of 42 V and 440 v respectively. Determine the terminal voltage, current and power output of each machine. The effect of armature reaction is to be neglected. 7M
   b) Explain the various methods of commutation 7M

5. Explain armature reaction and commutation in detail. 14M

6. Write short notes on the load characteristics of (a) D.C. shunt motor (b) D.C. compound motor (c) D.C. series motor 14M

7. Explain various methods for speed control of
   a) D.C shunt motor
   b) D.C Series motor 14M

8. Explain in detail following
   a) Swinburne's test
   b) Hopkinson test
   c) Retardation test 14M

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Hall Ticket Number :										

R-11/R-13

Code: 1G233

II B.Tech. I Semester Supplementary Examinations November 2016

Electrical Circuits-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any* **five** questions
All questions carry equal marks (**14Marks** each)
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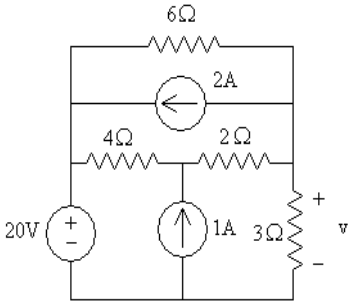
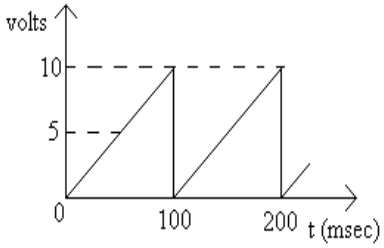
1. a) Define the following terms: Charge, Voltage, current, power, active and passive elements. 7M
   b) Explain current division and voltage division rules. 7M
2. a) Define the terms Node, Path, loop, branch, network and circuit 7M
   b) Find the value of 'v' for the circuit given in figure using nodal analysis



7M

3. a) Find average value , RMS value and form factor for the following waveform

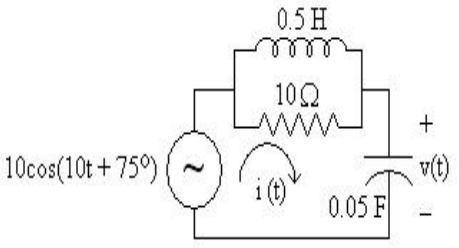


7M

   b) Write the conditions for phase comparison of sinusoidal signals. Find the phase angle by which $V_1(t)$ leads $V_2(t)$.

$$V_1(t) = 230 \sin (100t+30^0) \text{ volts}$$
$$V_2(t) = 120 \cos (100t+90^0) \text{ volts}$$ 7M

4. a) Find the value of v(t) for the following circuit



7M

   b) A series RLC circuit with R= 100Ω, L= 10mH is driven by an a.c. source of 230 V and 50Hz. Find the value of capacitor 'C' such that the circuit will be under resonance. Find the values of current, voltage across inductor and capacitor. Find the real and reactive powers absorbed by R, L and C. 7M

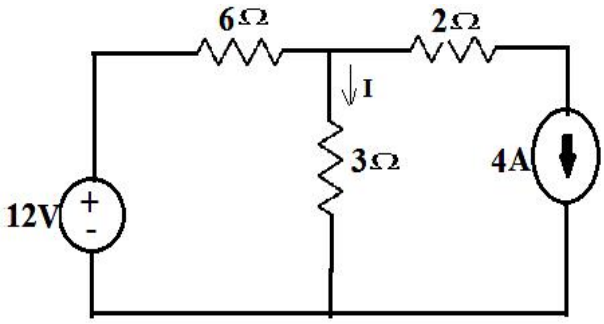
5. a) Find the relation between Line voltages and phase voltages, Line currents and phase currents for a balanced three phase delta connected system. draw the phasor diagram showing the phase relations. 7M

   b) A balanced star connected load having per phase impedance of Z_L= 40+j30 Ω is driven by a balanced star connected source of 110 V/ phase having negative phase sequence. Determine line currents, phase currents, line voltages, phase voltages, real and reactive power consumed by the load. 7M

6. a) Explain the concepts of self & mutual inductance. Derive the expression for coefficient of coupling for two magnetically coupled coils having self inductances L_1 , L_2 and a mutual inductance of M. 7M

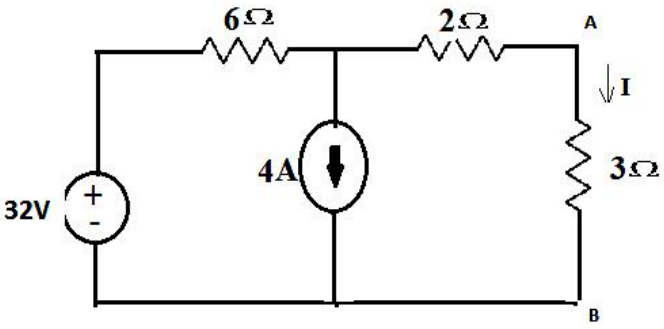
   b) Find the equivalent inductance of two magnetically coupled coils with self inductances L_1, L_2 and mutual inductance M connected in series aiding and opposition. 7M

7 a) Find the current 'I' for the following circuit using super position theorem



7M

   b) Find the thevinin's equivalent circuit between terminals A and B for the following circuit and then find the current in 3Ω load resistor.



7M

8. a) State and explain reciprocity theorem 7M

   b) State and explain millman's theorem 7M

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Hall Ticket Number :										

R-11/R-13

Code: 1G234

II B.Tech. I Semester Supplementary Examinations November 2016

Electromagnetic Fields

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any ***five*** questions

All Questions carry equal marks (14 Marks each)

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1. a) State Gauss law and derive Maxwell's first equation in integral form and point form. 9M

   b) A point charge Q_1=150μC located at (3,-2,-5) m experiences a force of F1=$5a_x$-$10a_y$+$10a_z$ due to a point charge Q_2 located at (4,-4,-3). Determine Q_2. 5M

2. a) i. What is an Electric Dipole? 3M
   ii. Derive the expression for Potential and Electric Field Intensity due to an Electric Dipole. 4M

   b) Two point charges Q_1=2μC and Q_2= -2μC located at (0, 0, 0.5) and (0,0,-0.5) respectively. Treating these two charges as the dipole at the origin. Calculate
   i) Potential V at P(4,0,6) and
   ii) $|E|$ at P. 7M

3. a) Derive the Dielectric Boundary conditions. 9M

   b) Determine the Capacitance of a capacitor consisting of two parallel metal plates 35x40 cm surface area, separated by 8 mm in air. Determine the total energy stored by the capacitance, if the capacitor is charged to a potential difference of 500V. What is the energy density of the capacitor? 5M

4. a) Derive the expression for Magnetic field intensity due to a straight thin current carrying filament. 7M

   b) A current element Idl = 10^{-3} (4ax-4ay-az) A-m is located at A (-6, 4,-3) produces a field dH at B(4,-5,4). **i)** Give a unit vector in the direction of dH at B. **ii)** Find $|dH|$ at point B. **iii)** At what direction should Idl have at A so that dH=0 at B? 7M

5. a) Derive the Amperes Circuit Law in point form and in integral form. 6M

   b) A uniform solenoid with a diameter of 100mm and length 450mm carries a current of I=5A and 200 turns. Find the magnetic field intensity on the axis of solenoid i) at the center. ii)at halfway from the center to one end. 8M

6. a) Derive the expression for on a straight and long current carrying conductor in a magnetic field. 6M

   b) A rectangular filamentary current loop is in Z = 0 plane has corners at (0,0,0), (1,0,0), (1,2,0), and (0,2,0). The loop carries a current of 5A. Find the total force on the loop and determine the torque on magnetic dipole of the rectangular loop. 8M

7. a) Derive Neumann's formula for Mutual Inductance. 7M

   b) An iron ring of toroid having 0.3cm in diameter and 12 cm^2 cross sectional area of the core is uniformly wound with 400 turns of the wire. If the flux density on the core is to be 1.5 Tesla and relative permeability of iron is μr=500, What is the exciting current required to be passed in the winding? Also determine the value of self-inductance and energy stored. 7M

8. a) Explain the modifications of Maxwell's equations for time varying electric and magnetic fields. 9M

   b) Find the conduction current density and displacement current density in a material having conductivity of 10-4 Siemens/m and €r=2.5. If the electric field in the material is E=5.5X10^{-6} sin(9.0x10^9)t volts/m. 5M

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