Hall Ticket Number :

Code : 1G536 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Fluid Mechanics and Hydraulic Machines

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1	a)	Discuss any four important fluid properties in detail.	7M
	b)	The velocity distribution in a viscous flow over a plate is given by $u = 4y - y^2$ for $y \leq 2m$ Where u = velocity in m/sec at a point distant y from the plate. If the coefficient of dynamic viscosity is 1.5 Pa.s determine the shear stress at y = 0 and at y= 2.0m	7M
2.	a)	Define and explain streamline, path line and streak line in fluid mechanics.	7M
	b)	Find the equation of stream line passing through (2,2) for the fluid flow V= –2yi–6xj	7M
3.	a)	Describe the Reynold's experiment with the help of a neat sketch.	7M
	b)	A 6 cm diameter pipe has a discharge of 450 l/min. At a section, the pipe has a sudden expansion to a size of 9 cm diameter. If the pressure just upstream of the expansion is 20 KN/ m^2, calculate the pressure just after the expansion. Assume the pipe to be horizontal.	7M
4.	a)	A jet of oil of specific gravity 0.7 strikes a fixed curved symmetrical plate at its center and leaves at the outlet tips. The diameter of the jet is 62 mm and the velocity of the jet is 45 m/sec. If the jet is deflected by 100 degrees, calculate the force exerted on the curved plate.	7M
	b)	How do you estimate the impact of a jet striking a moving normal plate in the direction of the jet?	7M
5.	a)	What are the types of hydroelectric power plants? Explain in detail.	7M
	b)	Explain how you will estimate the power developed by a power plant given its catchment area.	7M
6.	a)	Explain the working of a Pelton wheel with neat sketches?	7M
	b)	A Francis turbine works under a head of 8.5 m at a speed of 300 rpm. A power of 100 KW is developed with a discharge of 3 m^3/sec. The runner diameter is 2.2 m. Find the speed, discharge and power if the head is increased to 18m.	7M
7.	a)	What are the types of similarities between a prototype and a model?	7M
	b)	A hydraulic turbine develops 8000 KW under a head of 30 m at 250 rpm. What is the specific speed of the turbine? What would be the speed and power under a head of 18m.	7M
8.	a)	What is indicator diagram of a reciprocating pump? Explain the working of a reciprocating pump with a neat sketches.	7M
	b)	Determine the number of the impellers required for a multistage centrifugal pump to deliver 3000 litres per minute to a height of 200m at a speed of 800 rpm. The specific speed value is not to exceed 600.	7M

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Hall Ticket Number :										

Code : 1G233 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Electrical Circuits-I

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) State Kirchhoff's Voltage and Current Laws. 6M

   b) Find the power absorbed by each element in the circuit in Fig. 1.b.

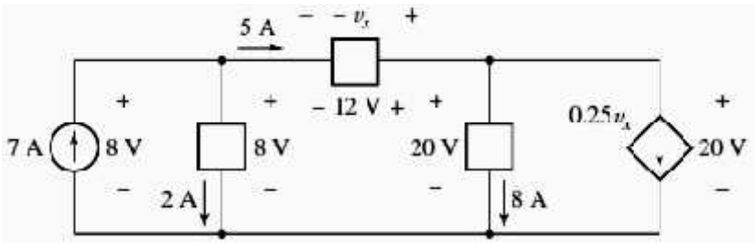

Fig.1.b. 8M

2. Determine v_3 in the circuit of Fig. 2.

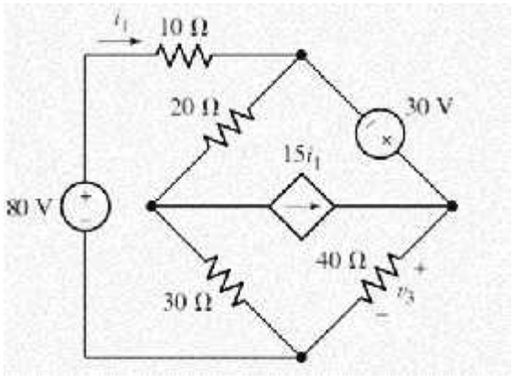

Fig.2. 14M

3 Find the r.m.s and average values, form factor and peak factor for the waveform shown in Fig.3.

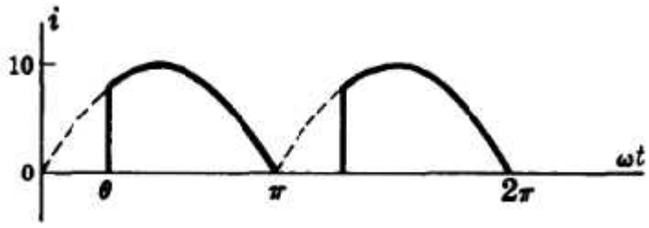

Fig.3. 14M

4. a) Find R_L which results in resonance for the circuit of Fig. 4.a. Draw the locus to explain the results.

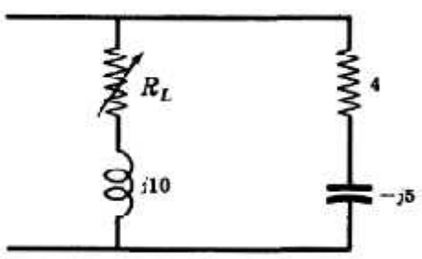

Fig.4.a 9M

   b) Three impedances Z_1 =(5 + j5) Ω, Z_2 = -j8 Ω and Z_3 = 4 Ω are connected in series to an unknown voltage source V. Find the current and supply voltage V if the voltage drop across Z_3 is $63.2\angle 18.45°$ volts. 5M

5. a) A balanced Y-connected load of (100 + *j* 50) Ω is connected to a balanced three-phase source. If the line current is 42 A and the source supplies 12 kW, determine the line voltage and the phase voltage. 7M

   b) Explain how the three-phase power is measured by two-wattmeter method with relevant diagrams in a star connected system. 7M

6. a) Explain about dot convention in coupled coils. 6M

   b) Two identical coils with *L* = 0.02 H have a coupling coefficient K = 0.8. Find *M* and the two equivalent inductances with the coils connected in series aiding and series opposing. 8M

7. a) Obtain the Thevenin's equivalent for the bridge circuit shown in Fig.7.a.

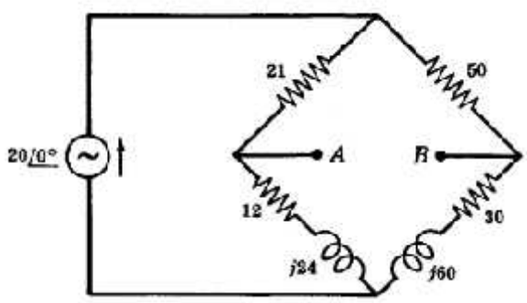

Fig.7.a 8M

   b) State and explain Maximum Power transfer theorem for ac circuits. 6M

8. a) State and explain Millman,s theorem. 6M

   b) Verify reciprocity theorem for the circuit shown in Fig.8.b.

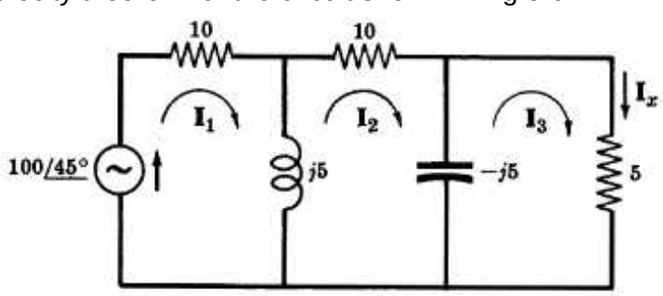

Fig.8.b. 8M

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Hall Ticket Number :										

Code : 1G234 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Electromagnetic Fields

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions
All Questions carry equal marks (14 Marks each)

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1. a) State and explain gauss's law in differential form and explain what do you mean by ▼.D? 10M
   b) An infinitely long uniform line charge is located at y=3, z=5. If ρ_l = 30 nC/m, find field intensity E at P(0,6,1) ? 4M
2. a) Calculate the potential at a point due to an infinitely long line charge of uniform density ρ_0 C/m situated on the z-axis by taking an appropriate reference of zero potential? 10M
   b) Define dipole and dipole element? 4M
3. a) Explain the phenomenon of polarization when a dielectric slab is subjected to an electric field, with the help of neat sketches. How this phenomenon reduces the electric field inside the dielectric? 8M
   b) A capacitor of parallel plates of 50 cm side is charged to a potential difference of 250 volt, when the plates are 1 mm apart. Find the work done in separating the plates from 1 mm to 3 mm. Assume perfect insulation? 6M
4. a) Find the magnetic field intensity at a point (r, ϕ, z) due to an infinitely long straight filament carrying a current I in the +z direction? 8M
   b) A wire carrying a current of 100 A is bent into the form of a circle of diameter 10 cm. Calculate (a) flux density at the centre of the coil (b) flux density at a point on the axis of the coil and 12 cm from it? 6M
5. a) Derive the expression curl H = J? 7M
   b) Show that the magneto static field can be describes in terms of vector potential which satisfies the vector Poisson's equation? 7M
6. a) Obtain the expression for force between two current carrying conductors? 8M
   b) What is the maximum torque on a square loop of 1000 turns in a field of intensity of 1 tesla? The loop has 10 cm sides and carries 3 A. What is the magnetic moment of the loop? 6M
7. a) Derive general expression for the boundary relations for static magnetic field for (**i**) tangential components (**ii**) normal components. Assume the common boundary has been separated by two different media having constants μ_1, ε_1 and μ_2, ε_2. The common boundary has a surface current density of K_s A/m? 9M
   b) A solenoid consisting of 1000 turns of wire wound on a former of length 100 cm and diameter 3 cm is placed co axially within another solenoid of the same length and the number of turns but diameter 6 cm. find the mutual inductance and the coupling co efficient of the arrangements? 5M
8. a) Explain the significance of displacement current? 7M
   b) A single turn rectangular loop of enclosed area 2 sq.m is situated in air with its plane normal to a magnetic field, which varies at the rate of 2Wb/m^2sec. Estimate e.m.f induced in the loop. 7M

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Hall Ticket Number :										

Code : 1G232 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Electrical Machines-I

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1.	a)	Derive the expression for electrical energy input in a singly excited system.	7M
	b)	Derive the expression for mechanical work done in a singly excited system by assuming that the movement is slow in nature.	7M
2.		A progressive simplex lap winding is to be designed for a 4 pole 14 slot 2 coil sides/slot dc armature. Obtain (**i**) winding table (**ii**) winding diagram in radial form (**iii**) position of brushes on the commutator.	14M
3.	a)	Explain the terms: (**i**) Critical field resistance (**ii**) Critical speed	7M
	b)	A 4 pole DC shunt generator with a shunt field resistance of 100 ohm and an armature resistance of 1 ohm has 378 wave connected conductors in its armature. The flux per pole is 0.02 wb. If a load resistance of 10 ohm is connected across the armature terminals and the generator is driven at 1000 rpm. Calculate the power absorbed by the load.	7M
4.	a)	Derive the expression for reactance voltage.	7M
	b)	Calculate the reactance voltage for a 4 pole lap wound generator if speed in rpm=300, diameter of commutator=1.12m, number of commutator segments=450, brush width = 2.25 cm, length of each conductor = 1m, effective length of core=0.3m, turns per coil = 2, full load armature current = 900 A.	7M
5.	a)	Explain the parallel operation of two series generator and also explain the use of equalizer bar.	7M
	b)	Two DC shunt generators operating in parallel share a load current of 200 A. Each generator has an armature resistance of 0.1 ohm and field resistance of 100 ohm. Their no load generated emfs are 250 V and 245 V. Calculate the bus bar voltage and the power output of each machine.	7M
6.	a)	What are the applications of various DC motors?	7M
	b)	A 250 V, DC shunt motor has an armature resistance of 0.5 ohm and a field resistance of 250 ohm. When driving a constant torque load at 600 rpm, the motor draws 21 A. what will be the new speed of the motor if an additional resistance of 250 ohm is inserted in the field circuit.	7M
7.	a)	Explain the Ward-Leonard method of speed control of a DC motor clearly with a neat diagram.	8
	b)	Explain the advantages and disadvantages of speed control by varying armature resistance.	6
8.	a)	Explain the retardation test for finding out the rotational losses of a DC machine.	7M
	b)	A retardation test is made on a separately excited DC machine as a motor. The induced voltage falls from 240V to 225V in 25 sec on opening the armature circuit and 6 sec on suddenly changing the armature connection from supply to load resistance taking 10 A (average). Find the efficiency of the machine when running as a motor and taking 25 A on a supply of 250 V. The resistance of its armature is 0.4 ohm and that of its field winding is 250 ohm.	7M

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Hall Ticket Number :										

Code : 1GC32 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Engineering Mathematics

(Common to EEE & ECE)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Find the Rank of the matrix $A=\begin{bmatrix}2 & -2 & 0 & 6\\ 4 & 2 & 0 & 2\\ 1 & -1 & 0 & 3\\ 1 & -2 & 1 & 2\end{bmatrix}$ by Reducing it to Canonical form. 7M

   b) Compute the Eigen values of the matrix A^{-1}, if $A=\begin{bmatrix}2 & 2 & 1\\ 1 & 3 & 1\\ 1 & 2 & 2\end{bmatrix}$ 7M

2. a) Compute the root of the Equation $x.\log_{10}{}^{(x)}=1.2$ using False position method. 7M

   b) Using Newton-Raphson method find a Numerical root of the Equation $x\sin x+\cos x=0$,which is near $x=®$. 7M

3. a) Obtain a relation of the form $y=a.b^x$ for the data $y(2)=8.3$, $y(3)=15.4$, $y(4)=33.1$, $y(5)=65.2$, $y(6)=127.4$, by the Method of Least squares. 7M

   b) Calculate the coefficient of correlation between age of cars and annual maintenance cost and comment

Age of cars (years)	2	4	6	7	8	10	12
Annual Maintenance cost (Rupees)	1600	1500	1800	1900	1700	2100	2000

   7M

4. a) Solve $2z+p^2+qy+2y^2=0$ by using Charpit's Method. 7M

   b) Form the Partial Differential equation by eliminating the arbitrary constants : $x^2+y^2+(z-c)^2=a^2$ 7M

5. a) Find the Half-Range Sine series for $f(x)=x(®-x)$, in $0<x<®$ and Deduce that $\frac{1}{1^3}-\frac{1}{3^3}+\frac{1}{5^3}-\frac{1}{7^3}+\ldots\ldots\ldots=\frac{®^2}{32}$ 7M

   b) Obtain the Fourier series for $f(x)=x-x^2$ in the Interval $[-®,®]$. 7M

6 a) Find the Fourier Transform of $f(x)=\begin{cases}a^2-x^2, if\ |x|<a\\ 0, if\ |x|>a>0\end{cases}$, and Hence Show that $\int_0^{\sim}\frac{\sin x-\cos x}{x^3}dx=\frac{®}{4}$. 14M

7. a) A Random variable X has the following probability function:

X	0	1	2	3	4	5	6	7
$p(X)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

   (i) Determine k.

   (ii) Evaluate $p(X<6)$, $p(X\geq 6)$, $p(0<X<5)$ and $p(0\leq X\leq 4)$.

   (iii) If $p(X\leq k)>\frac{1}{2}$, Find the minimum value of k and

   (iv) Determine the distribution function of X. (v) Mean (vi) Variance 14M

8 a) Define Binomial Distribution and deduce Mean and Variance 7M

   b) In a Normal Distribution 31% of the items are under 45 and 8% are over 64. Find the Mean and Variance of the Distribution. 7M

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Hall Ticket Number :										

Code : 1G231 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Switching Theory and Logic Design

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Convert the following numbers
   (i) $(1776)_{10}$ to base 6
   (ii) $(3.1415..)_{10}$ to base 2 4M
   b) Write a short note on gray code 4M
   c) A 7-bit hamming code is received as 0011011. what is the correct code (even parity) 6M
2. a) Reduce the following boolean expressions to the indicated no. of literals
   (i) a'b(d'+c'd)+b(a+a'cd) to one
   (ii) (a'+c)(a'+c')(a+b+c'd) to four 4M
   b) What are the universal gates realize all gates using universal gates 10M
3. a) Simplify the following Boolean expression using k-map
   (i) F(a,b,c,d) = a'b'c'd'+a'cd'+ab'd'+abcd+a'bd
   (ii) F(a,b,c,d) = ab'c+a'b+ac'd 6M
   b) Simplify the following Boolean function using Quine Mc-Clusky method
   F(a,b,c,d) = Σm(0,2,3,6,7,8,9,10,13) 8M
4. a) Design a gray to binary code converter and implement using logic gates? 8M
   b) Implement the following Boolean function with 8:1 mux
   F(a,b,c,d)=Σ(0,1,3,4,8,9,15) 6M
5. a) Compare PROM, PAL,PLA 4M
   b) Implement the following function using PLA
   A(x,y,z) = Σ(1,2,4,6)
   B(x,y,z) = Σ(0,1,6,7)
   C(x,y,z) = Σ(2,6)
   D(x,y,z) = Σ(1,2,3,5,7) 10M
6. a) Design the counter that goes through states 0, 1, 2, 4, 0,… using D flip-flops. 8M
   b) Convert SR flip flop to JK flip flop 6M
7. a) What are the capabilities and limitations of FSM 6M
   b) Draw the state diagram of mod-8 up-down counter in Moore model and obtain its state table. 8M
8. a) Draw the ASM chart for the following state transition, start from the initial state T1, then if xy=00 go to T2, if xy=01 go to T3, if xy=10 go to T1, otherwise go to T3 8M
   b) Show the exit paths in an ASM block for all binary combinations of control variables x,y and z, starting from an initial state. 6M

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