Hall Ticket Number :										

Code: 5G539 **R-15**

II B.Tech. I Semester Regular Examinations November 2016

Fluid Mechanics and Hydraulic Machines

(Electrical & 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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UNIT–I

1. a) Explain the Engineering Significance of dimensions & units in fluid mechanics 4M

   b) What are the different properties of rigid carbon tetrachloride at 20^{o}C has a viscosity of 0.000967NS/m^{2}. What shear stress is required to deform this fluid at a strain rate of 5000? 10M

OR

2. a) State the Newton's law of viscosity and give examples of its applications. 4M

   b) Define the equation of continuity. Obtain an expression for the continuity equation for a three dimensional flow. 10M

UNIT–II

3. a) What is hydro dynamics? What are the forces that are considered in solving the problems on hydrodynamics? 4M

   b) Derive an equation to measure the quantity of water flowing through a venturimeter. 10M

OR

4. a) What are the different energies of a moving fluid? Explain each one of them. 4M

   b) Water under pressure of 3.924X10^{-3}N/m^{2} is flouring through a 0.3m pie at the rate of 0.25 cumecs. If the is bent by 135^{o}, find the magnitude and direction of the resultant force on the bend. 10M

UNIT–III

5. a) Define the term impact of jet write its application. 4M

   b) A free jet moving with a velocity V strikes normally on a series of flat plates moving with a velocity of u and mounted radially on the periphery of a wheel. Determine the efficiency of the plates. 10M

OR

6. a) What is Hydroelectric power plant? How can you classify the power plants? 4M

   b) A jet of water 15cm diameter strikes of the centre of a smooth semi spherical vane. The velocity of the jet is 15m/sec. Find the through if the vane moves at a velocity of 5m/sec. 10M

UNIT–IV

7. a) Write brief note on the classification of hydraulic turbines. 4M

   b) A Pelton wheel working under a head of 500m. Produces 13,000kW at 429 rpm. If the efficiency of the wheel is 85%. Determine (i) discharge of the turbine (ii) diameter of the wheel (iii) diameter of the nozzle. 10M

OR

8. a) Define the terms uni power unit speed, and unit discharge with reference to a hydraulic turbine. 4M

   b) A turbine develops 10,000kW under a head of 25m at 135 rpm. What is the specific speed? What would be its normal speed and output under a head of 20m.? 10M

UNIT–V

9. a) Define the terms suction head, delivery head static head and manometric head. 4M

   b) A centrifugal pump has external / and internal impeller diameter as 600mm and 300mm respectively. The vane angle at inlet and outlet and 30^{o} and 45^{o} respectively. If the water enters the impeller at 2.5m/sec. Find the (i) speed of the impeller in rpm and (ii) work done per kg of water. 10M

OR

10. a) Explain the term slip with reference to reciprocating pump. 4M

    b) Derive an expression for the head lost due to friction in the delivery pipe of a reciprocating pump with and without an air vessel. 10M

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Hall Ticket Number :										

Code: 5GC32 **R-15**

II B.Tech. I Semester Regular Examinations November 2016

Mathematical Methods-III

(Common to EEE & ECE)

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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UNIT–I

1. a) Let A be a $m \times n$ matrix, then prove that $\rho(A) = \rho(A^T)$. 6M

   b) Solve the system of equations: $x_1 - x_2 + x_3 + x_4 = 2$; $x_1 + x_2 - x_3 + x_4 = -4$; $x_1 + x_2 + x_3 - x_4 = 4$; $x_1 + x_2 + x_3 + x_4 = 0$. 8M

OR

2. a) Determine the rank of the matrix $\begin{bmatrix} 0 & 1 & -3 & 1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ 8M

   b) State and prove the Cayley Hamilton theorem. 6M

UNIT–II

3. a) Show that the Regula-Falsi method has super linear convergence. 6M

   b) Employ Taylor's method to obtain appropriate value of y at $x = 0.2$ for the differential equation $\frac{dy}{dx} = 2x + 3e^x$, $y(0) = 0$. Compare the numerical solution obtained with the exact solution. 8M

OR

4. a) Using the bisection method, find a real root of the equation $\cos x = xe^x$ correct to three decimal places. 7M

   b) Apply fourth order Runge-Kutta method to $\frac{dy}{dx} = 3x + \frac{1}{2}y$, $y(0) = 1$ to determine $y(0.1)$ correct to four decimal places. 7M

UNIT–III

5. a) From the following table, estimate the number of students who obtained marks between 40 and 45 using Newton's interpolation formula.

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

   7M

   b) Find $f'(7.5)$ from the following table:

x	7.47	7.48	7.49	7.50	7.51	7.52	7.53
$f(x)$	0.193	0.195	0.198	0.201	0.203	0.206	0.208

   7M

OR

6. a) One entry in the following table is incorrect and y is a cubic polynomial in x. Use the difference table to locate and correct the error.

x	0	1	2	3	4	5	6	7
y	25	21	18	18	27	45	76	123

   7M

   b) Velocity V of a particle at distances from a point m its linear path is given by the following table. Estimate the time taken by the particle to travels the distance of 20 meters.

S(m)	0	2.5	5.0	7.5	10.0	12.5	15	17.5	20
V(m/sec)	16	19	21	22	20	17	3	11	9

   7M

UNIT–IV

7. a) The pressure and volume of a gas are related by the equation $PV^{¥} = k$, ¥ and k being constants. Fit this equation to the following set of observations

P(kg/cm²)	0.5	1.0	1.5	2.0	2.5	3.0
V (liters)	1.62	1.00	0.75	0.62	0.52	0.46

7M

b) Solve $\left(x^2 - yz\right)p + \left(y^2 - zx\right)q = \left(z^2 - xy\right)$. 7M

OR

8. a) Using the method of separation of variables, solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial y} + 2u$ subject to the condition $u = 0$ and $\frac{\partial u}{\partial y} = 1 + e^{-3y}$, when $x = 0$ for all values of y. 7M

b) Obtain the least square fit of the form $f(t) = ae^{-3t} + be^{-2t}$ for the following data

t	0.1	0.2	0.3	0.4
$f(t)$	0.26	0.58	0.44	0.35

7M

UNIT–V

9. a) Obtain a half range cosine series for $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$. Deduce the sum of the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots\cdots\infty$. 7M

b) Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2, & |x| \le 1 \\ 0, & |x| \ge 1 \end{cases}$. Hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos x/2 \; dx$ 7M

OR

10. If $f(x) = \begin{cases} 0, & -® \le x \le 0 \\ \sin x, & 0 \le x \le ® \end{cases}$, Prove that $f(x) = \frac{1}{®} + \frac{\sin x}{2} - \frac{2}{®}\sum_{n=1}^{\infty} \frac{\cos 2nx}{4n^2 - 1}$. Hence show that $\frac{1}{1\cdot 3} - \frac{1}{3\cdot 5} + \frac{1}{5\cdot 7} - \cdots\cdots\infty = \frac{1}{4}(® - 2)$ 14M

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Hall Ticket Number :										

Code: 5G231

R-15

II B.Tech. I Semester Regular Examinations November 2016

Switching Theory and Logic Design

(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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UNIT–I

1. a) I. Simplify the following expressions
   i) $A^1(B^1+C)$
   ii) $A^1+ B^1+ ABC^1)$
   iii) $xy + wxyz^1 + x^1y$
   II. What are error detecting and error correcting codes 8M

   b) i) A 7 bit hamming code is transmitted through a noisy channel. Find the error assuming a single error has occurred. The given message is 1010101
   ii) Find the 9's and 10's complement of $(92466)_{10}$ 6M

OR

2. a) i) Find the 1's and 2's complement of $(0111001)_2$
   ii) State and prove Demorgan's theorem 6M

   b) i) State any four properties of XOR gate
   ii) What are Universal gates? Implement NOT, AND & OR gates using Universal gates 8M

UNIT–II

3. a) i) Simplify using Boolean Algebra and implement using Basic gates
   $XYZ + XYZ^1 + XY^1Z + X^1Y^1Z + X^1YZ^1$
   ii) Demonstrate by means of truth table the validity of
   I. Associative Law
   II. Commutative Law 6M

   b) i) Prove that OR - AND Network is equal to NOR – NOR gate.
   ii) Simplify using K map $F(A,B,C,D) = \sum (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$ 8M

OR

4. a) i) Show that $ABC + A\,B\,C^1 + AB^1C+A^1B^1C+A^1B\,C^1=B^1C+AB+A^1B\,C^1$
   ii) Simplify using binary method $F= \pi M (0, 1, 2, 4, 5, 6, 9, 11, 12, 13, 14, 15)$. Implement the same using basic gates. 8M

   b) i) Express the Boolean $F= A^1 (B + C^1)$ as a product of max – terms
   ii) What is K map? State its advantages and limitations. 6M

UNIT–III

5. a) i) Draw the Block diagram of 3 to 8 decoder? Implement the following function using decoder $F= \sum (0, 2, 4, 5, 6, 7)$
   ii) What is magnitude comparator? Implement a 2 bit magnitude comparator using Basic gates 8M

   b) Implement the following expressions using PLA
   $F_1= \sum m (1, 2, 4, 6, 7)$, $F_2= \sum m (0, 1, 2, 4, 6)$ 6M

OR

6. a) i) Explain a 4 bit parallel adder with an example.
   ii) What is an encoder? Explain with circuit diagram a 8 line to 3 line priority encoder. 7M

   b) i) Draw the circuit of 3 bit fast adder and Explain
   ii) Implement the following expressions using PROM
   $F_1= \sum m (0, 1, 2, 4, 6, 7)$, $F_2= \sum m (0, 1, 2, 4, 6,)$ 7M

UNIT–IV

7. a) i) Convert SR Flip-Flop into D Flip-Flop.
   ii) Design a mod-12 synchronous counter using T Flip-Flop. 8M
   b) i) Compare combinational and sequential circuits.
   ii) What is race around condition? How it can be eliminated 6M

OR

8. a) i) Design a four bit Johnson counter. Explain with example.
   ii) Write the excitation table of JK & T Flip-Flops 7M
   b) i) Explain with truth table SR Flip-Flop and JK Flip-Flop
   ii) Design a 4 bit synchronous binary counter using JK Flip-Flop 7M

UNIT–V

9. a) i) What are the limitations of FSM
   ii) Define the state equivalence and machine equivalence with reference to sequential machines. Reduce the state table below.

PS	NS/Z	
	X=0	X=1
A	F|0	B|0
B	D|0	C|0
C	F|0	E|0
D	G|1	A|0
E	D|0	C|0
F	F|1	B|1
G	G|0	G|0
H	G|1	A|0

8M

   b) i) State Mealy and Moore machines give their comparisons
   ii) Discuss the various blocks of ASM chart 6M

OR

10. a) What is Mealy and Moore Machines? Give example. 6M
   b) Convert the following Mealy Machine into Moore Machine

PS	NS,Z	
	X=0	X=1
A	C,0	B,0
B	A,1	D,0
C	B,1	A,1
D	D,1	C,0

8M

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Hall Ticket Number :										

R-15

Code: 5G232

II B.Tech. I Semester Regular Examinations November 2016

Electrical Machines-I

(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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UNIT–I

1. a) What are generators? Discuss the operating principle of a DC generator. 7M
   b) Differentiate between lap winding and wave winding. 7M

OR

2. a) With a neat diagram, explain the constructional features of a DC generator. Explain each part of it. 10M
   b) Compare between simplex and duplex winding. 4M

UNIT–II

3. a) Compare between separately excited and self excited DC machines. 5M
   b) What is commutation? Discuss the methods of improving commutation in DC machines. 9M

OR

4. a) List different types of DC generators and their applications. 7M
   b) What is armature reaction? Discuss its effect. 7M

UNIT–III

5. a) What is residual magnetism? What is its significance in self excited DC generators? Explain. 6M
   b) What are the causes of failure to excite a self excited generator? Explain. 8M

OR

6. a) Why usually parallel operation of series generators is unstable? What remedial measures are taken for its successful operation? 6M
   b) Two DC shunt generators are operating in parallel have linear characteristics. One machine has a terminal voltage of 270 V on no load and 220 V at a load current of 30 A. The other machine has a voltage of 280 V on no load and 220 V at a load current of 40 A. Calculate the output current of each machine and the bus voltage when (**i**) the total load current is 50 A and (**ii**) load resistance is 10 ohms. 8M

UNIT–IV

7. a) From fundamentals derive the torque equation of a DC motor. 7M
   b) A 4-pole, lap wound DC motor has 540 conductors. Its speed is found to be 1000rpm.the flux per pole is 25 mwb. It is connected to 230 Volts dc supply. Ra is 0.8Ω. Calculate induced emf and armature current. 7M

OR

8. a) What is the need for speed control of a motor? Explain the Ward-Leonard system of speed control of DC motors. 10M
   b) Discuss various applications of DC motors. 4M

UNIT–V

9. a) Explain the Retardation test to estimate the rotational losses in a DC machine. 7M
   b) A DC machine is rated at 5 kW, 250 V, 2000 rpm. The armature resistance is 1 ohm. Driven from the electrical end at 2000 rpm the no load armature current of the machine is 1.2 A at 250 V with a field winding having a resistance of 250 ohms excited by 1 A. Estimate the efficiency of the machine as a 5 kW generator. 7M

OR

10. a) Explain about Field's test to determine the efficiency of a series motor. 7M
    b) The Hopkinson's test on two identical dc shunt machines gave the following results for full load: Line voltage: 250 V; Line current excluding field currents: 50 A; Motor armature current: 380 A; Field currents: 5 A and 4.2 A. Draw the circuit diagram and mark the values. Assuming armature resistance of each machine is 0.02 ohms, determine efficiency of each machine. 7M

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Hall Ticket Number :										

R-15

Code: 5G233

II B.Tech. I Semester Regular Examinations November 2016

Electrical Circuits-I

(Electrical & 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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UNIT–I

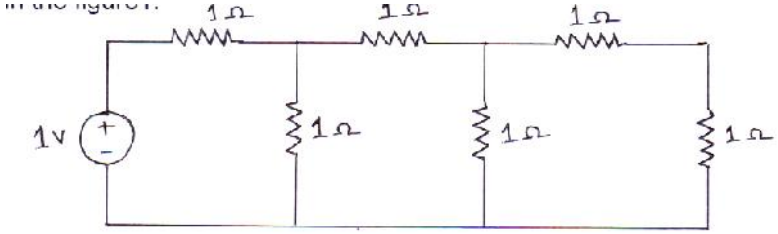
1. a) State and explain Kirchoff's laws with examples and limitations 7M

   b) A heater element takes 8 MW power when connected to the power mains. This element is redrawn such that the length of the element is doubled. Determine the power consumed when connected to the same power mains. 7M

OR

2. a) Prove that internal resistances of voltage source and current source are same during transformation 5M

   b) Find the power dissipated in the resistor R in the ladder network shown in the figure1.



9M

UNIT–II

3. a) Explain the significance of operator-j in alternating circuits. 5M

   b) A series circuit having pure resistance of 40Ω,pure inductance of 50mH and a capacitor is connected across a 400V,50Hz supply. This series combination circuit draws 10A.Calculate

      (i) Power factor of the circuit.

      (ii) Capacitance in μF 9M

OR

4. a) Derive and expression for resonant frequency, band width of a series RLC circuit. 7M

   b) A series RLC series circuit has R=1000 Ω,L=100mH,C=10 μF. If a voltage of 100V is applied across the series combination the determine

      (i) Resonant frequency

      (ii) Q-factor

      (iii) Half power frequencies 7M

UNIT–III

5. a) State and explain Tellegen's Theorem. 3M

   b) A bridge network formed by 4 arms is as follows. AB=2 Ω,BC=3 Ω,CD=4 Ω,DA=5 Ω.A 6 Ω resistance is connected between B and D.A battery source of 9V is connected with internal resistance of 1 Ω between A and C such that A is positive and C is negative. Calculate current through 6 Ω resistance by
   (i) Norton's Theorem
   (ii) Thevenin's Theorem 11M

OR

6. a) State and explain Compensation Theorem. 3M

   b) State and prove maximum power transfer theorem for a passive network connected to an active network consisting of current and voltage sources and linear bilateral elements, when the passive network load consists of
   (i) A variable resistance only
   (ii) A variable resistance and a variable reactance
   What is the transmission efficiency in case (ii) 11M

UNIT–IV

7. a) Derive Impedance parameters of a two port network. 5M

   b) Determine the hybrid parameters with the following data.
   (i) With the output terminals shorted
   V_1=25V,I_1=1A,I_2=2A
   (ii) With the output terminals opened
   V_1=10V,V_2=50V,I_2=2A 9M

OR

8. a) Derive Admittance parameters of a two port network. 5M

   b) Prove that hybrid parameters will not exist for a two port network when Z_{22}=0. 9M

UNIT–V

9. a) What is the analogy between electric and magnetic circuits? 5M

   b) A steel ring of 180 cm mean diameter has a cross sectional area of 250mm^2.Flux developed in the ring is 250μWb when a 4000 turns coil carries certain current.
   Calculate (i) MMF required (ii) Reluctance (iii) Current in the coil.
   Assume relative permeability of steel is 1100. 9M

OR

10. a) State and explain the principle of duality and explain the graphical method to draw dual network? 7M

    b) What is complete incidence matrix? How is reduced incidence matrix obtained from it? Explain with suitable example. 7M

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Hall Ticket Number :										

R-15

Code: 5G234

II B.Tech. I Semester Regular Examinations November 2016

Electromagnetic Fields

(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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UNIT–I

1. a) State and derive Columb's law of force between any two point charges? 7M

   b) A 2mc positive charge is located in vacuum at P_1 (3,-2,-4) and 5μc negative charge at P_2 (1,-4, 2). (a) Find the vector force on the negative charge. (b) What is the magnitude of the force on the charge at P_1? 7M

OR

2. a) Define potential and potential difference? 7M

   b) Given the electric flux density $\bar{D} = 0.3 r^2 \bar{a_r}$ nC/m² in free space.
   (a) Find $\bar{E}$ at r = 2, θ=25°, Φ = 90°.
   (b) Find the total charge within the sphere r =3? 7M

UNIT–II

3. a) What is dipole? Derive the expression for potential due to a dipole? 7M

   b) A dipole of moment $\bar{P} = 6\bar{a_z}$ nC/m is located at origin in free space
   i) Find E at P (r=4, θ=20°, Φ=0°)? 7M

OR

4. a) Derive the expression for capacitance between co-axial cylinders? 7M

   b) Explain the continuity equation and point form of continuity equation? 7M

UNIT–III

5. a) State and explain Biot –Savarts law? 7M

   b) Obtain an expression for the magnetic field intensity due to infinitely long current carrying conductor? 7M

OR

6. a) State and explain Ampere's circuital law? 7M

   b) A circular loop located on $x^2 + y^2 = 9$ carries a current of 12A. Determine H at (0, 0, 6) and (0, 0, -6). Take the direction of current in anti-clockwise direction? 7M

UNIT–IV

7. a) Derive Lorentz force equation? 7M

   b) An infinite filamentary conductor on the Z-axis carries a current of 2A in the $\bar{a_z}$ direction. Find the magnitude of the force on 1 inch length of the conductor in the field
   a) $\bar{B} = 0.1a_x - 0.2a_z$ wb/m² b) $\bar{B} = 0.3a_x - 0.4a_y$ wb/m²? 7M

OR

8. a) State and explain the Magnetic boundary conditions? 7M

   b) Calculate the inductance of a solenoid 8cm in length, 2cm in radius having μr = 100 and carrying 800 turns of wire? 7M

UNIT–V

9. a) Explain the concept of displacement current? 7M

   b) Distinguish clearly the dynamically induced emf and statically induced emf. Explain with neat sketches? 7M

OR

10. Write the Maxwell's equations for harmonically varying fields? 14M

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