Hall Ticket Number :										

R-17

Code: 7G233

II B.Tech. I Semester Regular Examinations November 2018

Electrical Circuits – 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)

****

UNIT–I

1. a) Explain the star-to-delta and delta-to-star transformation for a resistive network. 7M

   b) Find a single source equivalent at the terminals of a circuit shown in fig.1

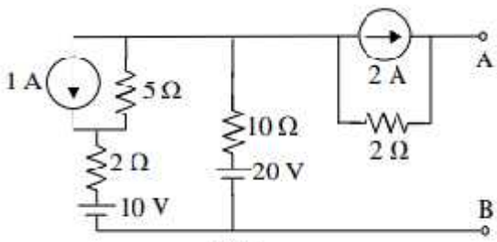

Fig.1 7M

OR

2. a) Use the nodal analysis to determine voltage at node 1 and the power supplied by the dependent current source in the network shown in fig:2.

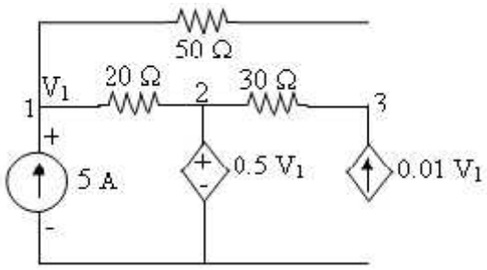

Fig.2 7M

   b) Describe the procedure to construct the dual of a network with an example. 7M

UNIT–II

3. a) A series RLC circuit with R=100Ω , L = 0.5H, C=40μF has an applied voltage of 100 0 with variable frequency. Calculate the resonance frequency, current at resonance and voltage across R, L, and C. Also calculate the Q-factor, upper and lower cutoff frequencies. 7M

   b) Give the detailed comparison of series and parallel resonant circuits. 7M

OR

4. a) A coil having a resistance of 20 ohms and an inductance of 0.2 H is connected in series with a 50 μF capacitor across a 250 V, 50 Hz supply. Calculate (i) the current (ii) the power (iii) the power factor (iv) the voltage across the coil and capacitor. Draw the phasor diagram showing the current and various voltages. 8M

   b) Show that power consumed in a purely inductive circuit is zero when sinusoidal voltage is applied across it. 6M

UNIT–III

5. a) State and explain the Maximum power transfer theorem. 7M

   b) Find V_L in the circuit shown in fig.3, using superposition theorem.

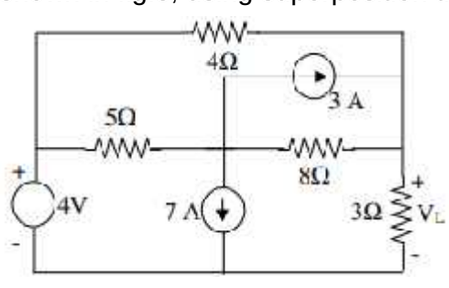

Fig.3 7M

OR

6. a) State and explain Thevenin's theorem. 7M

   b) For the network shown in fig.4, find the current through 1.375 ohms resistor and hence verify reciprocity theorem.

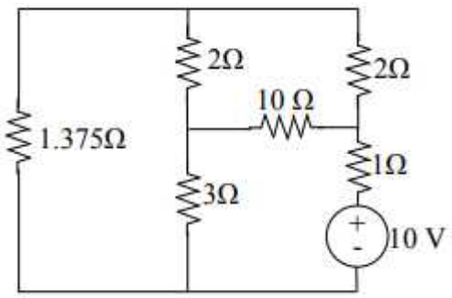

Fig.4 7M

UNIT–IV

7. a) The following equations give the voltages V_1 and V_2 at the two ports of a two port network, $V_1=5I_1+2I_2$, $V_2=2I_1+I_2$; A load resistance of 3Ω is connected across port-2. calculate the input impedance. 7M

   b) Explain Two port network parameters using transformed variables. 7M

OR

8. a) Find the equivalent y parameter network for the T-network shown in fig.5.

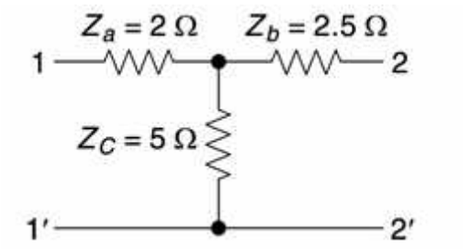

Fig.5 7M

   b) Find the equivalent z parameter network for the π-network shown in fig.6.

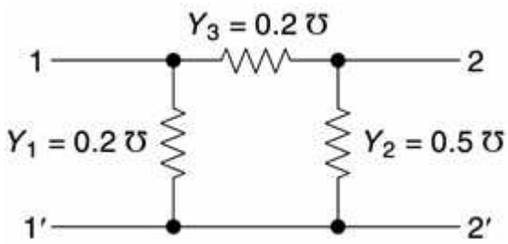

Fig .6 7M

UNIT–V

9. a) Two coils connected in series have an equivalent inductance of 0.8 H when connected in aiding, and an equivalent inductance of 0.5 H when the connection is opposing. Calculate the mutual inductance of the coils and coupling coefficient. 7M

   b) Explain Self and Mutual Inductance in coupled magnetic circuits. 7M

OR

10. a) Write the procedure to analyze a parallel magnetic circuit. 7M

    b) What is a magnetic circuit? Compare magnetic circuit with an electric circuit. 7M

***

Hall Ticket Number :										

R-17

Code: 7G536

II B.Tech. I Semester Regular Examinations November 2018

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)

****

UNIT–I

1. a) A flat plate (Weight = 280 N) of area 0.6 m^2 is sliding down an inclined plane (30ºC to the horizontal) with a velocity of 0.36 m/s. A fluid of thickness 1.8 mm is present between the plane and plate. Determine the viscosity of the fluid. 7M

   b) The left leg of a U-tube Mercury manometer is connected to pipeline carrying water. The level of Mercury (Sp. Gravity = 13.6) in the left leg is 1 m below the center of pipeline and the right leg is open to atmosphere. The level of Mercury in the right leg is 0.55 m above that of the left leg, and the space above Mercury in the right leg contains Benzene (Sp. Gravity = 0.9) to a height of 0.4 m. Determine the pipe pressure. 7M

OR

2. a) Discuss the influence of the following fluid properties on fluid motion

      i. Viscosity, ii. Specific gravity, iii. Surface tension, iv. Mass density 4M

   b) Derive the differential form of 1D steady-state continuity equation in Cartesian form for an incompressible fluid. 10M

UNIT–II

3. a) Write down the Euler equation of motion for steady flow along a streamline. State and derive the Bernoulli equation from Euler's equation. List out various assumptions made for the same. 7M

   b) Three pipes are connected parallel to each other. The lengths of pipes are 1800 m, 1500 m, and 1900 m respectively, and the corresponding diameters are 1.25 m, 1 m and 1.4 m respectively. Determine discharge in all the pipes, assuming the discharge at the inlet to be 4.5 m^3/s. The friction factor for all the pipes is assumed to be 0.006. 7M

OR

4. Gasoline (Sp. Gravity = 0.8) is flowing upward through a vertical pipe, which tapers in diameter from 30 cm to 15 cm. A gasoline mercury differential manometer is connected between 30 cm and l5 cm pipe section to measure its flow rate. The distance between the manometer tapping is 1 m and the gauge reading is 50 cm of mercury. Neglecting the losses between the pipe tapping. Determine the following.

   (i) The differential gauge reading in terms of gasoline head

   (ii) Gasoline flow rate 14M

UNIT–III

5. a) What do you mean Hydroelectric power plant? Give the basis of selection and classification of these plants. Give the detailed construction and working principle of the Hydroelectric plant. 7M

   b) A Hydroelectric power station is designed to operate at a mean head of 205 m. It is fed by a reservoir having a catchment area of 1000 km^2 with an annual rainfall of 125 m of which 80% is available for power generation. The expected load factor is 75%. Allowing a head loss of 5 m and assuming the Turbine and Generator efficiency to be 90% and 95% respectively. Calculate the suitable rating of the power station in MW. Comment on the type of Turbine to be used to maintain the power station rating. 7M

OR

6. a) A jet of water moving at 60 m/s is deflected by a vane moving at 25 m/s in a direction 30º to the direction of the jet. The water jet leaves the blades normally to the motion of vanes. Draw the inlet and exit velocity triangles for the vane. Assuming the relative velocity at the exit to be 85% that of the inlet and no shock at the inlet, determine the following.
   (i) The vane angle at inlet and exit
   (ii) The work done per kg of water entering the vanes 10M

   b) State Impulse-Momentum principle, and show that, the rate of change of momentum is an impulsive force. 4M

UNIT–IV

7. a) A Turbine develops 12000 kW power under a head of 30 m at 150 rpm. Determine the following. (i) Specific speed , (ii) Normal speed and (iii) Power output under a head of 25 m 7M

   b) Give the basis of selection of Turbines. List out the effect of different parameters on the performance of Turbines. Plot the variation of following parameters for the Pelton Turbine, at the constant head. Explain the nature of each plot.
   (i) Speed Vs Discharge (ii) Speed Vs Power
   (iii) Speed Vs Efficiency 7M

OR

8. A Pelton wheel turbine working under a head of 359 m runs at 750 rpm and generates 9560 kW. The overall efficiency of the turbine = 85%, Jet ratio = 6, Coefficient of velocity = 0.985, Speed ratio = 0.45, No. of poles in the generator = 36. Draw the velocity diagram of the Turbine, and determine the following.
   (i) Runner diameter (ii) Jet diameter
   (iii) No. of jets required (iv) Synchronous speed of the generator
   (v) Specific speed of the Turbine

   Assume suitable data, if necessary. 14M

UNIT–V

9. The outer diameter of the impeller of a Centrifugal pump is 400 mm and the outlet width is 50 mm. The pump is running at 800 rpm and working against a head of 15 m. The vane angle at the outlet is 40° and the manometry efficiency is 75%. Determine the following.
   (i) Flow velocity at the outlet
   (ii) The velocity of water leaving the vane
   (iii) Angle made by the absolute velocity with the direction of motion at the outlet
   (iv) Discharge of pump 14M

OR

10. A single acting reciprocating pump has a piston diameter of 0.15 m and a stroke length of 0.3 m. The center of the pump is 5 m above the level of water in the sump and 33 m below the delivery water level. The lengths of suction and delivery pipes are 6.5 m and 39 m respectively and both the pipes have the same diameter of 75 mm. if the pump is working at 30 rpm, determine the following.
   (i) Pressure head on the piston at the beginning, middle, and end of both suction and delivery stroke
   (ii) Power required to drive the pump

   Take atmospheric pressure as 10.3 m of water and Darcy's friction factor for both the pipes as 0.04. 14M

***

Hall Ticket Number :										

R-17

Code: 7G232

II B.Tech. I Semester Regular Examinations November 2018

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)

****

UNIT–I

1. a) Convert the following Hexadecimal numbers into their binary equivalents:
   i. $(A23.4E)_{16}$
   ii. $(F23)_{16}$
   iii. $(0.45B)_{16}$ 9M

   b) Encode the binary word into a 7-bit even Hamming code:1010 5M

OR

2. a) Represent the following decimal numbers in 2's complement representation using 8- bits:
   i. -44
   ii. 64
   iii. -89 9M

   b) State and prove the Boolean theorems. 5M

UNIT–II

3. a) Simplify the following using Boolean algebra:
   i. $Y(A,B,D) = (\overline{A}+B)(A+B+D)\overline{D}$
   ii. $Y(A,B,C) = \sum_m (0,2,4,6)$ 7M

   b) Simplify the following using K-map and implement it using basic gates only.
   $f(A,B,C,D) = \sum_m (0,2,8,10) + d(4,6,7,11,15)$ 7M

OR

4. a) Minimize the following logic function using K-map and implement using logic gates. $Y(A,B,C,D) = \sum_m (0,1,2,3,4,7,8,9,10,11,12,14)$ 7M

   b) What is meant by standard SOP form? Convert the given function in standard SOP form. $f(A,B,C,D) = \overline{A} + BC\overline{D} + A\overline{C}$. 7M

UNIT–III

5. a) Distinguish between the multiplexer and de-multiplexer. 5M

   b) Implement the following two Boolean functions with a PLA.
   $F_1(A,B,C) = \sum_m (0,1,2,4)$
   $F_2(A,B,C) = \sum_m (0,5,6,7)$ 9M

OR

6. a) Implement a full adder using a 3-line-to-8 line decoder. 7M

   b) Design a combinational circuit using PROM, the circuit accepts a 3-bit binary number and generates its equivalent XS-3 code. 7M

UNIT–IV

7. a) How does a J-K flip-flop differ from an S-R flip-flop in its operation? What are its advantages over an S-R flip-flops? 4M

   b) Design a synchronous mod-6 counter using J-K flip-flop. 10M

OR

8. a) What are the various methods used for triggering the flip-flops? 4M

   b) Design synchronous 3-bit up-down counter using J-K Flip-flop. 10M

UNIT–V

9. a) Write the comparison between the Mealy machines and Moore machines. 4M

   b) For the state table of the machine given below, find the equivalence partition and a corresponding reduced machine in the standard form.

PS	NS,Z	
	X=0	X=1
A	***D,0***	***H,1***
B	***F,1***	***C,1***
C	***D,0***	***F,1***
D	***C,0***	***E,1***
E	***C,1***	***D,1***
F	***D,1***	***D,1***

10M

OR

10. a) Write the salient feature of ASM chart 4M

    b) For the state table of the machine given below, find the equivalence partition and a corresponding reduced machine in the standard form.

PS	NS,Z	
	X=0	X=1
A	***F,0***	***B,1***
B	***F,0***	***A,1***
C	***D,0***	***C,1***
D	***C,0***	***B,1***
E	***D,0***	***A,1***
F	***E,1***	***F,1***
G	***E,1***	***G,1***

10M

***

Hall Ticket Number :										

R-17

Code: 7GC32

II B.Tech. I Semester Regular Examinations November 2018

Engineering Mathematics – III

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

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

****

UNIT–I

1. a) Find a real root of the equation $x^3 - 3x - 5 = 0$ by the method of false position correct to three decimal places. 7M

   b) Find the real root of the equation $x = e^{-x}$ using Newton-Raphson method. 7M

OR

2. a) Employ Taylor's method to obtain the approximate values of y at $x = 0.1, 0.2$ for the differential equation $\frac{dy}{dx} = x - y^2,\ y(0) = 1.$ 7M

   b) Apply Runge-Kutta method of order 4, compute $y(0.2)$ *and* $y(0.4)$ from the equation $\frac{dy}{dx} = x + y,\ y(0) = 1.$ 7M

UNIT–II

3. a) The population of a town in the decennial census was given below

Year : x	1891	1901	1911	1921	1931
Population: y (in thousands)	46	66	81	93	101

   Estimate the population for the year 1895. 7M

   b) Use Lagrange's interpolation formula to find the value of y when $x = 3.5$ from the following table

x	0	1	3	4
y	-12	0	12	24

7M

OR

4. a) Find the first and second derivatives of the function tabulated below at the point $x = 1.5$

x	1.5	2.0	2.5	3.0	4.0
y	3.375	7.0	13.625	38.875	59

7M

   b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using

   (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}$ rule, (iii) Simpson's $\frac{3}{8}$ rule with $h = 0.5$ *and* 0.25 7M

UNIT–III

5. a) Find the values of $a, b \text{ and } c$ so that $y = a + bx + cx^2$ is the best fit to the data

x	0	1	2	3	4
y	1	0	3	10	21

7M

b) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ 7M

OR

6. a) Determine the values of $a \text{ and } b$ by the method of least squares such that $y = ae^{bx}$ fits the following data

x	0	1	2	3
y	1.05	2.10	3.85	8.30

7M

b) Solve $x^2 \frac{\partial u}{\partial x} + y^2 \frac{\partial u}{\partial y} = 0$ by employing the method of separation of variables. 7M

UNIT–IV

7. Prove that $x^2 = \frac{®^2}{3} + 4\sum_{n=1}^{\infty} (-1)^n \frac{\cos nx}{n^2}, \ -® < x < ®$ by using Fourier series and hence show that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{®^2}{6}$ 14M

OR

8. Obtain a half range cosine series for $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$

and deduce the sum of the series is $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{®^2}{8}$ 14M

UNIT–V

9. a) Find the Fourier transform of $f(x) = \begin{cases} a^2 - x^2, & for \ |x| \le a \\ 0, & for \ |x| > a \end{cases}$ 7M

b) Find the Fourier cosine transform of $e^{-ax}(a > 0)$. Hence Evaluate $\int_0^{\infty} \frac{\cos^{a} x}{x^2 + a^2} dx$ 7M

OR

10. Obtain the Fourier sine transfromation of

$$f(x) = \begin{cases} 4x, & for \ 0 < x < 1 \\ 4 - x, & for \ 1 < x < 4 \\ 0, & for \ x > 4 \end{cases}$$

14M

***

Hall Ticket Number :										

R-17

Code: 7G334

II B.Tech. I Semester Regular Examinations November 2018

Analog Electronics-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)

****

UNIT–I

1. a) Draw the circuit diagram of emitter follower and derive the expressions for voltage and current gains and input and output impedances 8M

   b) What is the use of transformer coupling in the output of multistage amplifier? 6M

OR

2. a) Draw the CE amplifier with un bypassed emitter resistance and derive expressions for input impedance and voltage gain. 7M

   b) Draw the circuit diagram of single stage RC coupled BJT amplifier. Discuss the effect of an emitter bypass capacitor on low frequency response. 7M

UNIT–I

3. a) Draw the circuit diagram of voltage series feedback. Derive the expressions for A_V, R_I and R_0 for the circuit. 7M

   b) Draw the frequency response of an amplifier without and with feedback and show the band width for each case. 7M

OR

4. a) An amplifier with negative feedback give an output of 13V with an input of 2 V. when feedback is removed it requires 0.25 V input for the same output. find
   (i)The value of voltage gain without feedback.
   (ii)Value of β, if the input and output are in phase and β is real. 8M

   b) Compare the feedback topologies with respect to R_{if} and R_{of}. 6M

UNIT–III

5. a) Draw the circuit diagram of Colpitts oscillator and explain its working. Derive the Expression for frequency of oscillation. 7M

   b) In a transistorized Hartley oscillator the two inductances are 2mH and 20μH while the frequency is to be changed from 900kHz to 2100 kHz. Calculate the range over which the capacitor is to be varied. 7M

OR

6. a) Draw the circuit diagram of Wien bridge and Explain its working. Derive the Expression for frequency of oscillation. 7M

   b) Explain briefly about Frequency and Amplitude stability of an oscillator. 7M

UNIT–IV

7. a) Define conversion efficiency. Determine the maximum value of conversion efficiency for a series - fed class A power amplifier. 7M

   b) Class-A Transformer coupled power amplifier delivers maximum A.C power of 5 watts to a 4Ω load if the operating point is located for maximum symmetrical swing and V_{CC}=20V,Calculate
      (i) Secondary to primary turns ratio
      (ii) Peak output current
      (iii) Operating point
      (iv) Efficiency 7M

OR

8. a) Compare series fed and transformer coupled class A power amplifier. 6M

   b) Draw a neat circuit diagram of push pull class-B amplifier. Explain its working. 8M

UNIT–V

9. a) Derive an expression for output of a RC differentiator circuit when its input is exponential signal. Determine the transmission error. 8M

   b) Compare and contrast series diode clipper and shunt diode clipper. 6M

OR

10. a) A 2 KHz symmetric square wave of ±20 V is applied to a RC circuit having 2 msec. time constant. Calculate and plot the output to the scale for RC configuration as
       i) High pass circuit
       ii) Low pass circuit. 7M

    b) Draw the circuit diagram for positive peak clamper circuit and explain its principle of operation. 7M

***

Hall Ticket Number :										

R-17

Code: 7G231

II B.Tech. I Semester Regular Examinations November 2018

DC 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)

****

UNIT–I

1. a) Give the constructional features and working principle of a D.C generator. Draw the cross-sectional view of a 4-pole generator and label all the parts. 8M

   b) A 4-Pole, lap wound d.c. shunt generator has a useful flux per pole of 0.07Wb. The armature winding consists of 220 turns each of 0.004 ohms resistance. Calculate the (i) induced e.m.f. (ii) terminal voltage when running at 900 r.p.m if the armature current is 50A. 6M

OR

2. a) Explain the need of equalizer rings and dummy coils in DC generators. 7M

   b) A 4-pole, long shunt lap wound generator supplies 25KW at a terminal voltage of 500V. the armature resistance is 0.05 ohms and shunt field resistance is 180 ohms. The brush drop may be taken as 1V.Determine the EMF generated. Also calculate the number of conductors if the speed is 1200 r.p.m and flux per pole is 0.02weber. 7M

UNIT–II

3. a) Explain the different methods of excitation of DC generators with suitable diagrams. 7M

   b) A 240KW, 400V, 6-pole D.C. generator as 720 lap wound conductors. It is given a brush lead of 2.5 degrees (Mech.) from the geometric neutral. Calculate the cross and demagnetizing turns per pole. The shunt field circuit resistance is 200 ohms. 7M

OR

4. a) What is commutation? What causes sparking at the commutator surface? Explain the process of reversal of current during commutation. 8M

   b) A 4-pole, lap wound armature running at 1450 r.p.m. delivers a current of 90A and has 64 commutator segments. The brush width is equal to 1.4 commutator segments and inductance of each mature coil is 0.06mH. Calculate the value of the reactance voltage. Assume linear commutation. 6M

UNIT–III

5. a) Explain OCC, internal and external characteristics of DC shunt generator. 8M

   b) State the requirements of voltage build up in self-excited DC generator. 6M

OR

6. a) Under what conditions will two shunt generators operating in parallel divide the total load in exact proportion to the machine rating? 6M

   b) Two 220V generators operate in parallel. One machine has a terminal voltage of 260V on no-load and 220V when supplying 30A. The second machine has voltage of 270V on no load and 220V when supplying 45A. Calculate (i)the output voltage (ii) current 8M

UNIT–IV

7. a) Derive the expression for the electromagnetic torque developed in a D.C.motor. 7M

   b) Explain briefly voltage method of speed control of DC motors 7M

OR

8. a) Explain and sketch the speed-current, speed-torque and torque-current characteristics of shunt and series motors. 7M

   b) Draw a neat sketch of 3-point starter and explain its working. 7M

UNIT–V

9. a) Explain with a circuit diagram how efficiency is determined for machines by Hopkinson's test 7M

   b) In Field's test on two 230V, 1.5kW mechanically coupled similar series motors; the following data has been obtained. Each has armature and compole winding resistance of 2.4 ohms, series field resistance of 10A. The generator supplied a current of 8.9A at a terminal Potential difference of 161V. Calculate the efficiency and output of the motor for this load. 7M

OR

10. a) Mention the merits and demerits of Swinburne's test. Why this test cannot be perfumed on a series motor. 6M

    b) In retardation test on a D.C motor gave the following results. With field unexcited the speed fall from 1525 RPM to 1475 RPM in 44 seconds. With field normally excited the speed drop occurred in 26seconds. Determine the moment of inertia of the rotating parts at 1500RPM.and core loss for normal excitation at this speed. 8M

***