Hall Ticket Number :										

R-17

Code: 7G231

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

DC 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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UNIT–I

1. a) A DC machine is to be designed for a low voltage but high current requirements. Suggest the best suitable winding for this requirement and justify your answer. 8M

   b) A 4-pole, 250V DC long-shunt compound generator supplies a load of 10kW at the rated voltage. The armature, series and shunt field resistances are 0.1Ω, 0.15 Ω and 250 Ω respectively. The armature is lap wound with 50 slots, each slot containing 6 conductors. If the flux per pole is 50 mWb, calculate the speed of the generator. 6M

OR

2. a) Derive the expression for the emf induced in a DC generator. Explain the factors influencing the magnitude of emf induced. 8M

   b) An 6 pole lap wound generator armature has 720 conductors, a flux of 25 mwb and a speed of 600 r.p.m. Calculate the e.m.f generated on open circuit. If the same armature is wave wound, at what speed it be driven to generate 600 volts? 6M

UNIT–II

3. a) What is meant by Commutation? Differentiate between good commutation and bad commutation. Enumerate the mechanical and electrical conditions leading to poor commutation in a DC machine. 8M

   b) In a 200 V compound generator, the armature, series and shunt windings have resistances of 0.25 Ω, 0.15 Ω and 50 Ω respectively, the load consists of 100 lamps, each rated at 60 W, 220 V. Find the total emf and armature current when the machine is connected for

   (i) long shunt and (ii) short shunt 6M

OR

4. a) Comment on the use of interpoles and compensating winding in a DC machine. 4M

   b) What is Armature Reaction and what are its adverse effects on the operation of a DC machine? Also, derive the expressions for de-magnetizing and cross-magnetizing ATs per pole in case the brushes are given a lead of θ degrees from GNA in case of generator. 10M

UNIT–III

5. a) What is the difficulty in operating two DC Compound generators in parallel? With illustrations, explain how this can be overcome. 8M

   b) Bring out the reasons for the failure of self excitation of a DC machine. 6M

OR

6. a) Discuss the factors determining the load distribution between a number of DC shunt generators running in parallel. 6M

   b) Elucidate the external characteristics of various DC generators bringing out the applications of each. 8M

UNIT–IV

7. a) Derive the expression for torque developed by a DC motor. 6M

   b) Illustrate the load characteristics of DC Shunt, Series and Compound motors and thereby suggest the suitability of these motors for various applications. 8M

OR

8. a) The armature and shunt field resistances of a 500V shunt motor are 0.2 ohm and 100 ohm respectively. Find the resistance of the shunt field regulator to increase the speed from 800 rpm to 1000 rpm if the current taken by the motor is 450A. The magnetization characteristic may be assumed as a straight line. 7M

   b) Explain the method of controlling the speed of a DC motor that provides a smooth control in both the directions. 7M

UNIT–V

9. a) When Direct load test is preferred for testing DC machines? Explain how efficiency of DC machine be determined using direct load test. 6M

   b) Explain the method to separate stray losses in a DC machine. 8M

OR

10. a) Describe the Regenerative method of testing a DC machine. Also, bring out its merits and demerits. 8M

    b) A 500V shunt motor takes 8A on no-load. The armature and field resistances are 0.2 ohm and 250 ohms respectively. Find the efficiency of the machine when run as a generator delivering a current of 90A at 500V 6M

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Hall Ticket Number :										

R-17

Code: 7G233

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

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)

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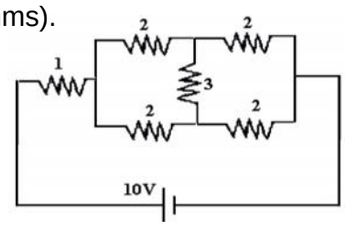
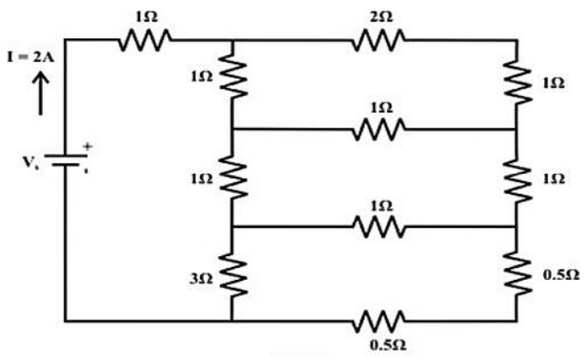
UNIT–I

1. a) Find the total power dissipated in the circuit shown in the figure. (All resistances are in ohms).



7M

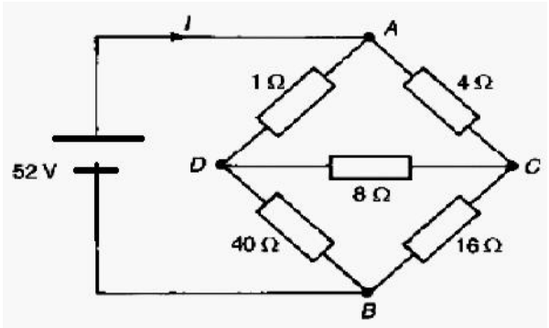
b) Find the value of the voltage source V_s that delivers 2 Amps current through the circuit as shown in figure.



7M

OR

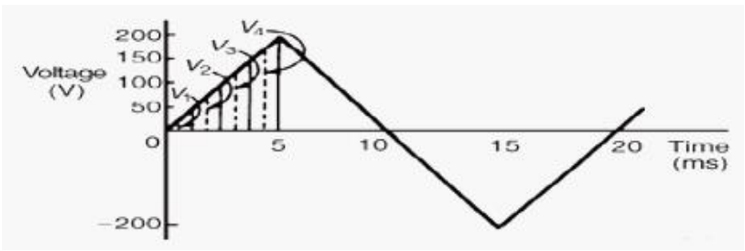
2. For the bridge network shown in figure below by using suitable delta – star transformations, Find The value of the single equivalent resistance that replaces the network between terminals A and B. (i) The current supplied by the 52 V source. (ii) The current flowing in the 8 Ω resistor.



14M

UNIT–II

3. For the periodic waveforms shown in figure below, determine: (i) Average value over half cycle. (ii) Frequency. (iii) RMS value. (iv) Form factor. (v) Peak factor



14M

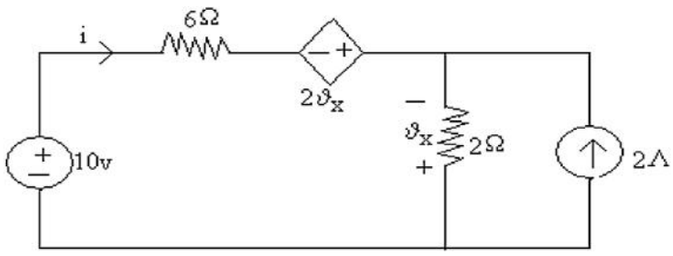
OR

4. a) Define the Q - factor and derive an expression showing the relation between Q -factor, Band width and selectivity of frequencies at resonance. 7M

b) Show that for a series RLC circuit $f_r = \sqrt{f_1 f_2}$ f = where f_r resonant frequency and f_1 and f_2 are half power frequencies. 7M

UNIT–III

5. a) Find the current in the 6 ohm resistor shown in circuit diagram, using superposition theorem.

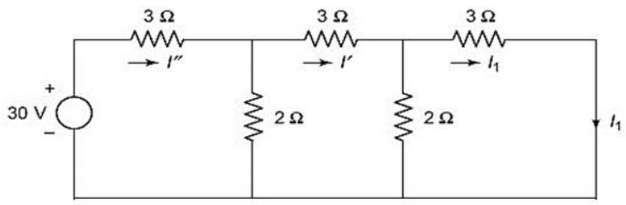


7M

b) State and explain Maximum power transfer theorem with an example. 7M

OR

6. a) Verify the reciprocity theorem for the given circuit shown below.

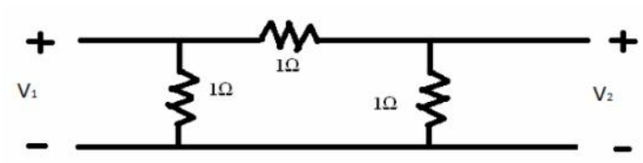


7M

b) Explain Millman's Theorem with a suitable example. 7M

UNIT–IV

7. a) Obtain the Y and Z parameters for the two port network shown in below figure.

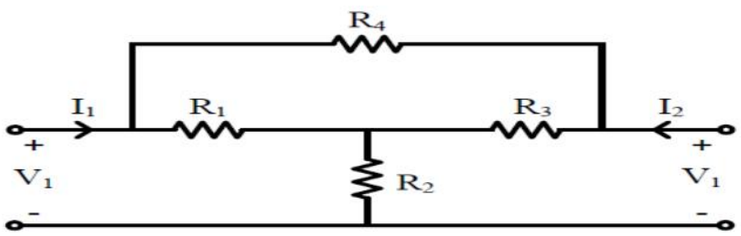


7M

a) Obtain the relation between Hybrid and ABCD parameters. 7M

OR

8. Determine the [Z] and [Y] parameters of the following two port network based on two-port interconnection technique.



14M

UNIT–V

9. a) Two coils connected in series-aiding fashion have a total inductance of 250mH. When connected in a series-opposing configuration, the coils have a total inductance of 150 mH. If the inductance of one coil is three times the other, find L_1, L_2 and M. What is the coupling coefficient? 7M

b) Distinguish between self-inductance and mutual inductance. 7M

OR

10. a) The two coils are connected in Parallel and they have self-inductance of 40mH and 10mH respectively. The total inductance of the circuit is found to be 50 mH. Determine: (i) The mutual inductance between the two coils. (ii) The coefficient of coupling. 7M

b) Develop an expression for equivalent inductance of two coupled coils connected in parallel with mutual inductance. 7M

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Hall Ticket Number :										

R-17

Code: 7GC32

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

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)

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UNIT–I

1. a) Find a root of the equation $x^3 - 2x - 5 = 0$ by using Bisection method.

   b) Find a root of the equation $x \log_{10} x = 1.2$ by using Regula Falsi method.

OR

2. a) Solve $y' = x + y$ given $y(1) = 0$. Find $y(1.1)$ and $y(1.2)$ by Taylor's method.

   b) Using Runge-Kutta method of order 4, find $y(0.2)$ for the equation $\frac{dy}{dx} = \frac{y - x}{y + x}, y(0) = 1.$

UNIT–II

3. a) Find the cubic polynomial which takes the following values. Hence find $f(4)$.

x	0	1	2	3
y	1	2	1	10

   b) Use Lagrange's Interpolation formula to the following data to find the values of y when $x = 10.$

x	5	6	9	11
y	12	13	14	16

OR

4. a) Apply Trapezoidal rule to evaluate $\int_0^6 x \sec x \, dx.$

   b) Use Simpsons $1/3^{rd}$ rule to find $\int_0^{0.6} e^{-x^2} \, dx.$

UNIT–III

5. a) Fit a straight line of the form $y = ax + b$ to the following data,

x	1	2	3	4	5	6	7	8
y	5.4	6.3	8.2	10.3	12.6	14.9	17.3	19.5

   b) Solve the Partial differential equation $p^2 + q^2 = x + y$ by Charpit's method.

OR

6. a) Fit the second degree parabola to the following data.

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

   b) Using method of separation of variables, Solve $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0, \; u(x, 0) = 4e^{-x}.$

UNIT–IV

7. a) Expand the function $f(x) = x\sin x$ as Fourier series in the interval $-® \le x \le ®$. Deduce that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + \ldots = \frac{1}{4}(® - 2)$.

   b) Expand $f(x) = \frac{x}{2}$ as a Fourier series in the interval $-® < x < ®$.

OR

8. a) Express $f(x) = x$ as a half range cosine series in $0 < x < 2$.

   b) If $f(x) = \begin{cases} x, & 0 < x < ®/2 \\ ® - x, & ®/2 < x < ® \end{cases}$ then show that

$$f(x) = \frac{4}{®}\left[\sin x - \frac{1}{3^2}\sin 3x + \frac{1}{5^2}\sin 5x + \cdots\right].$$

UNIT–V

9. a) Using Fourier integral representation, show that $\int_0^\infty \frac{\mu \sin x\mu}{1+\mu^2}\,d\mu = \frac{®}{2}e^{-x}$, $(x > 0)$.

   b) Find the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$.

OR

10. a) Find the Fourier sine transform of xe^x.

    b) Find the finite Fourier sine and cosine transform of $f(x) = 2x,\ 0 < x < 4$.

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Hall Ticket Number :										

R-17

Code: 7G536

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

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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UNIT–I

1. a) Write briefly about different types of Pressure measuring devices 7M

   b) A fan delivers 4 m^3 of air per second at 20^0C and 1.25 bar. Assuming molecular weight of air as 28.97, calculate the mass of air delivered. Also determine the density, specific volume and specific weight of the air being delivered. 7M

OR

2. a) What is the difference between U-tube differential manometer and inverted U-tube differential manometer? Where are they used? 7M

   b) Shaft 80 mm in diameter is being pushed through a bearing sleeve 80.20mm in diameter and 300 mm long, The clearance is filled with oil having a kinematic viscosity of 0.005 m^2/s and specific gravity 0.90. If the shaft moves axially at 0.50m/s. find the resistance offered by the oil on the shaft. 7M

UNIT–II

3. a) A venturimeter of 150 mm × 75 mm size is used to measure the flow rate of oil having specific gravity of 0.9. The reading shown by the U tube manometer connected to the venturimeter is 150 mm of mercury column. Calculate the coefficient of discharge for the venturimeter if the flow rate is 1.7 m^3/min. (Note : The size of venturimeter generally specified in terms of inlet and throat diameters) 7M

   b) Derive friction factor for the flow through the circular pipe by Darcy Weisbach equation? 7M

OR

4. a) Two pipes one of 10cm diameter, 200 m long and another 15cm diameter, 400 m long are connected in parallel. The friction factors are 0.0075 for the smaller pipe and 0.006 for the large pipe. The total discharge through the system is 50 lit/sec. Find the discharge and head loss in each pipe. Neglect minor losses. Calculate the equivalent length of a 20 cm diameter having f=0.005 7M

   b) State the momentum equation and mention some of its engineering applications 7M

UNIT–III

5. a) A jet 200 mm diameter moving at a velocity of 20 metres per second impinges normally on a series of flat vanes mounted over a wheel. If the velocity of the vanes is 8 metres per second, find (i) the force exerted by the jet on the wheel,(ii) the work done by the jet on the wheel per second, and (iii) the hydraulic efficiency 7M

   b) Derive an expression for the force exerted by a jet striking the curved plate at one end tangentially when the plate is symmetrical. 7M

OR

6. a) Explain hydroelectric power plant working principle with neat sketch. 7M

   b) Discuss various type of Draft tubes with neat sketch. 7M

UNIT–IV

7. a) A Kaplan turbine works under a head of 60m at a speed of 145rpm utilizing 175 m^3/s of water. Diameter of runner and hub are 5.60m & 3.20m. Turbine develops 82500 kW. Find i) flow ratio ii) speed ratio iii) overall efficiency iv) specific speed. 7M

   b) Explain what is meant by unit quantities in turbines. Derive expressions for unit speed, unit discharge and unit power of a turbine. 7M

OR

8. a) What is the importance of a draft tube in a Francis turbine? Discuss different types of draft tubes. 7M

   b) A turbine is to operate under a head of 25 meters at 200 rpm. The discharge is 9 m^3/sec. If the turbine efficiency is 90% determine: (i) specific speed of the turbine (ii) power generated (iii) performance under a head of 20 meters. Also state the type of the turbine. 7M

UNIT–V

9. a) List out necessary precautions against cavitation in centrifugal pumps. 7M

   b) Explain the working of reciprocating pump with neat sketch. 7M

OR

10. a) Draw and discuss characteristic curves of a pump. 7M

    b) A double acting reciprocating pump having piston area 0.1m has a stroke of 0.30m long. The pump is discharging 2.4 m^3 of water per minute at 45 rpm through a height of 10 m. Find the slip of the pump and power required to drive the pump. 7M

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Hall Ticket Number :										

R-17

Code: 7G232

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

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) Convert the following numbers:
   i. $(4567)_8$ to base 10.
   ii. $(11001101.0101)_2$ to base 8 and base 4.
   iii. $(53.1575)_{10}$ to base 2. 8M

   b) i. Explain error detection codes. What is the drawback of error detection codes?
   ii. Construct even parity 7 bit hamming code for the message 0100. 6M

OR

2. a) State duality theorem. List Boolean laws and their duals. 6M

   b) Simplify the following Boolean functions to minimum number of literals.
   i. F = ABC + ABC' + A'B.
   ii. F = (A+B)' (A'+B'). 8M

UNIT–II

3. a) Define prime implicant and essential prime implicant with example using K-map. 7M

   b) Find all the prime implicants for the following Boolean function using K-map and determine which are essential?
   F(A,B,C,D) = Σ(1,3,4,5,9,10,11,12,13,14,15) 7M

OR

4. a) Simplify the following Boolean expressions using K-map and implement them using NOR gates:
   i. F (A, B, C, D) = AB'C' + AC + A'CD'.
   ii. F (W, X, Y, Z) = W'X'Y'Z' + WXY'Z' + W'X'YZ + WXYZ. 8M

   b) Simplify the following Boolean function for minimal SOP form using K-map and implement using NAND gates.
   F(W,X,Y,Z) = Σ(1,3,7,11,15) + d(0,2,5). 6M

UNIT–III

5. a) Implement full adder using decoder and OR gates. 7M

   b) Design a combinational circuit that accepts a three-bit binary number and generates an output binary number equal to the twice the input number 7M

OR

6. a) Explain the general combinational PLD configuration with suitable block diagram. 7M

   b) Give the logic implementation of a 32 x 4 bit & 8 x 4 bit ROM using suitable decoder 7M

UNIT–IV

7. a) Design a mod-6 synchronous counter using T-flip flop. 7M

   b) Draw the circuit of a negative edge triggered JK Flip-Flop with active high. Explain its operation with the help of truth table. 7M

OR

8. a) 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. 6M

   b) Design Mod-12 synchronous counter using J-K flip –flops 8M

UNIT–V

9. 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

OR

10. a) Explain the salient features of the ASM chart. 10M

    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 $\rightarrow$ 01 $\rightarrow$ 10 $\rightarrow$ 11 $\rightarrow$ 00 and repeats. If x = 0, the circuit holds the present state". 4M

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Hall Ticket Number :										

R-17

Code: 7G334

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

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)

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UNIT–I

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

   b) What is the use of Transformer coupled amplifiers and explain with simple example applications? 6M

OR

2. a) Draw the CB amplifier Circuit and derive expressions for input impedance and voltage gain. 7M

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

UNIT–II

3. a) Draw the circuit diagram of voltage series feedback. Derive the expressions for AV, RI and R0 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 15V with an input of 5 V. when feedback is removed it requires 0.5 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. 7M

   b) Compare the feedback topologies with respect to Rif and Rof. 7M

UNIT–III

5. a) Draw the circuit diagram of Crystal Oscillators 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 800kHz to 1500 kHz. Calculate the range over which the capacitor is to be varied. 7M

OR

6. a) Draw the circuit diagram of RC-phase shift and Explain its working. Derive the Expression for frequency of oscillation. 7M

   b) Explain briefly about Oscillator types and list out the applications of it. 7M

UNIT–IV

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

   b) Class-A Transformer coupled power amplifier delivers maximum A.C power of 8watts to a 5Ω load if the operating point is located for maximum symmetrical swing and VCC=30V,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 B power amplifier. 7M

   b) Draw a neat circuit diagram of complementary symmetry of class-B amplifier. Explain its working. 7M

UNIT–V

9. a) Derive an expression for output of a RC differentiator circuit when its input is step. Determine the transmission error. 7M

   b) Compare and contrast diode based clamper in series and shunt with examples. 7M

OR

10. a) A 2 KHz symmetric square wave of ±20 V is applied to a RC circuit having 2msec. 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 Transistor clippers circuit and explain its principle of operation. 7M

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