Hall Ticket Number :										

R-15

Code: 5G252

III B.Tech. I Semester Supplementary Examinations May 2019

Transmission of Electric Power

(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) Derive an expression for inductance/phase for a 3Φ overhead transmission line when conductors are unsymmetrically spaced but lines are transposed. 7M

   b) Calculate the inductance/phase of a 3Φ double circuit line if the conductors are spaced at the vertices of the hexagon with sides 1.8m each. The diameter of each conductor is 1.5cm. 7M

OR

2. a) Derive an expression for the capacitance of 1Φ overhead transmission line. 7M

   b) Calculate the capacitance of 1Φ overhead line consisting of a pair of parallel wires 12mm in diameter and spaced uniformly 2.5m apart. If the line is 30km long and its one end is connected to 50KV, 50Hz system. What will be the charging current when the other end is open circuited. 7M

UNIT–II

3. a) Derive the ABCD parameters of nominal – T represented medium length transmission line with neat phasor diagram. 7M

   b) A 100km long 3Φ, 50Hz transmission line has the following line constants. Resistance/km/phase – 0.1ohm, Inductive reactance/km/phase – 0.25ohm. Susceptance/km/phase – $10x\ 10^{-6}$ mho. If the line delivers a load of 20 MW at 0.9pf lagging at 66KV at the receiving end. Using Nominal π method, calculate a) sending end voltage b) sending end current c) sending end pf d) voltage regulation e) transmission efficiency. 7M

OR

4. a) Using rigorous method derive the expression for sending end voltage and current for a long transmission line. 7M

   b) A 132KV, 50Hz, 3Φ transmission line delivers a load of 50MW at 0.8pf lagging at the receiving end. The generalized constants of the transmission line are $A=D = 0.95\angle 1.4^0$, $B = 96\angle 78^0$, $C = 0.0015\angle 90^0$. Find the regulation of the line and charging current. Use nominal T method. 7M

UNIT–III

5. a) Derive an expression for sag in overhead lines when i) supports are at equal levels ii) supports are at unequal levels. 7M

   b) A transmission line has a span of 150m between level supports. The conductor has a cross-sectional area of $2cm^2$. The tension in the conductors is 2000kg. If the specific gravity of the conductor material is $9.98m/cm^3$ and wind pressure is 1.5kg/m length. Calculate the sag and vertical sag. 7M

OR

6. a) What is Corona and what are the factors that affect the corona. 7M

   b) A 3Φ, 220KV, 50Hz transmission line consists of 1.5cm radius conductors spaced 2m apart in equilateral triangular formation. If the temperature is 40^0 C and atmospheric pressure is 76cm. Calculate the corona loss/km of the line. Take $m_0 = 0.85$. 7M

UNIT–IV

7. a) Explain the variation of current and voltage on an overhead line when one end of the line is short circuited and open circuited. 7M

   b) A cable with surge impedance of 100ohm is terminated in two parallel connected open wire lines having surge impedances of 600 and 1000ohms respectively. If a steep fronted voltage wave of 1000V travels along the cable. Find from the first principles the voltage and current in the cable and open wire lines immediately after the travelling wave has reached the transition point. The line may be assumed to be of infinite length. 7M

OR

8. Derive the expression of reflection and refraction coefficient line terminated through a resistance and capacitance 14M

UNIT–V

9. a) Derive the formulae for dielectric stress in an underground cable 7M

   b) Determine the maximum and minimum stress in the insulation of 33KV, single core cable which has core diameter of 1.5cm and sheath of inside diameter 5cm. 7M

OR

10. a) Explain the different types of insulating material that are available for the underground cables 7M

    b) Derive the expression for the capacitance of single and three core cables. 7M

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Hall Ticket Number :										

R-15

Code: 5G254

III B.Tech. I Semester Supplementary Examinations May 2019

Electrical and Electronics Measurements

(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) Describe the construction and working of PMMC instrument. Derive the equation for deflecting if the instrument is spring controlled. Describe the method of damping used in these instruments? 9M

   b) Design an Ayrton shunt to provide an ammeter with current ranges of 1 A, 5 A and 10 A. a basic meter with an internal resistance of 50 Ω and a full scale deflection current of 1 mA is to be used? 5M

OR

2. a) Describe the design and constructional features used in potential transformers for reduction of ratio and phase angle errors? 10M

   b) A current transformer with a bar primary has 300 turns in its secondary winding. The resistance and reactance of the secondary circuit are 1.5Ω and 1.0Ω respectively including the transformer winding. With 5 A flowing in the secondary winding, the magnetizing mmf is 100 A and the iron loss is 1.2W. Determine the ratio and phase angle errors? 4M

UNIT–II

3. a) Derive the expression for torque of an Electrodynamometer type wattmeter when the instrument is used on a.c. Explain why it is necessary to make the potential coil circuit purely resistive? 8M

   b) A 3 phase 500V motor load has a power factor of 0.4.two wattmeters connected to measure the input. They show the input to be 30 KW. Find the reading of each instrument? 6M

OR

4. a) Describe the constructional details of a single phase induction type energy meter? 7M

   b) The meter constant of a 230V, 10A watthour meter is 1800 revolutions per kWh. The meter is tested at half load and rated voltage and unity power factor. The meter is found to make 80 revolutions in 138s. Determine the meter error at half load? 7M

UNIT–III

5. a) Draw the circuit of a wheatstone bridge and derive the conditions of balance? 7M

   b) A Kelvin bridge is balanced with the following constants:

   Outer ratio arm 100Ω and 1000Ω

   Inner arms ratio 99.92Ω and 1000.6Ω

   Resistance of link 0.1Ω

   Standard resistance 0.003377Ω

   Calculate the value of unknown resistance? 7M

OR

6. a) Explain why Maxwell's inductance-capacitance bridge is useful for measurement of inductance of coils having storage factor between 1 and 10? 7M

   b) What are the modifications and additional features incorporated in a low voltage Schering's bridge for it to be used on high voltages? Explain. 7M

UNIT–IV

7. a) Draw the circuit diagram of a Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance? 8M

   b) In the measurement of power by a polar potentiometer, the following readings were obtained:

   Voltage across a 0.2Ω standard resistance in series with the load = $1.46 \angle 32^0$

   Voltage across a 200: 1 potential divider across the line = $1.37 \angle 56^0$ V

   Estimate the current, voltage, power and power factor of the load? 6M

OR

8. a) Describe a method of experimental determination of flux density in a specimen of magnetic material using a ballistic galvanometer. Explain how the correction for flux in the air space between the specimen and the coil is applied? 10M

   b) In a test on a specimen of total weight 13 kg the measured values of iron loss at a given value of peak flux density were 17.2 W at 40 Hz and 23.9 W at 60 Hz. Estimate the values of hysteresis and eddy current losses in W/kg at 50 Hz for the same value of peak flux density? 4M

UNIT–V

9. a) Describe how the following measurements can be made with the use of a CRO:

      (i) Frequency

      (ii) Phase angle 10M

   b) A CRT has an anode voltage of 2000V and parallel deflecting plates 2 cm long and 5 mm apart. The screen is 30 cm from the centre of the plates. Find the input voltage required to deflect the beam through 3 cm. the input voltage is applied to the deflecting plates through amplifiers having an overall gain of 100? 4M

OR

10. a) Draw and explain the circuit of a digital frequency meter. What are the different methods for high frequency determination? 10M

    b) The lowest range on a 4 ½ digit DVM is 10 mV full scale. What is sensitivity of the meter? 4M

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Hall Ticket Number :										

R-15

Code: 5G251

III B.Tech. I Semester Supplementary Examinations May 2019

Electrical Machines-III

(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) Define the following
   (i) Pole Pitch (ii) Coil Span (iii) Pitch Factor
   (iv) Distribution Factor (v) Winding Factor 7M

   b) Determine the slot distribution and pole phase group sequence for 45-slot, 6-pole, 3-phase winding. 7M

OR

2. a) Explain about Space and Slot harmonics in alternators. 7M

   b) Calculate the rms value of the induced emf per phase of a 10 pole, 3-ø, 50 Hz alternator with 2 slots/pole/phase and 4 conductors per slot. The coil span is 150^0 electrical. The flux per pole has a fundamental component of 0.12 Wb and 20% third harmonic component. 7M

UNIT–II

3. a) What is an air gap line? Explain how open circuit and short circuit test is conducted on a synchronous machine. 7M

   b) The following test results were obtained on 6,600 V alternator,

V_{oc} (V)	3100	4900	6600	7500	8300
I_f (A)	16	25	37.5	50	70

   A field current of 20 A is sufficient to circulate a full load current on short circuit. Calculate the full load voltage regulation at 0.8 pf lagging by using MMF method. 7M

OR

4. a) With phasor diagram, develop the expression for finding regulation of a salient pole alternator during lagging power factor, using two reaction theory. 7M

   b) Describe slip test method to calculate X_d and X_q in synchronous generator. 7M

UNIT–III

5. a) Explain the operation of alternator on infinite busbar with varying steam input. 7M

   b) A 1500 kVA, 3-ø star connected 6.6 kV, 8- pole, 50 Hz synchronous generator has a reactance of 0.6 per unit and negligible resistance. Calculate the synchronizing power per mechanical degree at full load 0.8 pf lagging. 7M

OR

6. a) Explain the two bright and one dark method of synchronization of alternators. 7M

   b) Two identical 3-ø alternators are coupled in parallel to a total load of 1500kW of 11kV, 0.8 pf lagging. The alternator has R_a = 2.8 Ω/ phase and X_s = 60Ω/ phase. The power supplied by each machine being maintained the same, the excitation of first alternator is adjusted so that its armature current is 45 A lagging. Find the power factor at which each alternator operates. 7M

UNIT–IV

7. a) Explain the various starting methods of synchronous motor. 7M

   b) Derive the condition for maximum mechanical power developed by synchronous motor. 7M

OR

8. a) What is hunting in synchronous motor? Explain how it can be suppressed. 7M

   b) A 2000 V, 3- phase, star connected synchronous motor has an effective resistance and synchronous reactance of 0.2Ω and 2.2Ω per phase respectively. The input is 800 kW at normal voltage and the induced line emf is 2500 V. Calculate the line current and power factor. 7M

UNIT–V

9. a) With neat diagram explain the construction and working of variable reluctance Stepper Motor. 7M

   b) Compare the working of ac series motor and universal motor. 7M

OR

10. a) Draw and explain the torque – speed characteristics of single phase induction motor based on the concept of double field revolving theory. 7M

    b) A universal series motor has a resistance of 30Ω and an inductance of 0.5 H. When connected to a 250V dc supply and loaded to take 0.8 A it runs at 2000 rpm. Determine the speed, torque and power factor when connected to a 250V, 50 Hz, ac supply and loaded to take the same current. 7M

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Hall Ticket Number :										

R-15

Code: 5G359

III B.Tech. I Semester Supplementary Examinations May 2019

Linear and Digital Integrated Circuits Applications

(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) List out the AC characteristics of an op-amp and discuss about them. 7M

   b) Define the terms, CMRR and input bias current. Describe the techniques used for the measurement of these parameters 7M

OR

2. a) What are the three differential amplifier configurations? Compare and contrast these configurations. 7M

   b) Explain ac analysis of differential amplifier. 7M

UNIT–II

3. a) Design an Astable multivibrator using 555 timer for a frequency of 1 kHz and a duty cycle of 70%. Assume C=0.1µf. 7M

   b) b) Give the block diagram of NE 565 PLL and explain the role of each block. Make circuit connections to track the incoming signal and explain its operation. 7M

OR

4. a) Draw and explain the operation of Mono stable multivibrator using 555 timer. Derive the expression for time delay. 7M

   b) Draw the dc voltage versus phase difference characteristic of balanced modulator phase detector of a PLL indicating all important regions. 7M

UNIT–III

5. a) Discuss about successive approximation converter with necessary diagrams 7M

   b) Explain about R2R ladder type DAC. 7M

OR

6. a) Explain about the operation of Counter type ADC. 7M

   b) Explain about the operation of Flash type ADC and Discuss its advantages & Disadvantages 7M

UNIT–IV

7. a) What are the different factors considered in TTL/CMOS interfacing? Explain. 7M

   b) Explain the logic levels and noise margins of TTL 7M

OR

8. a) Design CMOS NOR gate and analyze its behavior using switch models. 7M

   b) Discuss the static electrical behavior of CMOS logic circuits. 7M

UNIT–V

9. a) Realize 16 input multiplexer using two 8 input multiplexers. 7M

   b) Implement a 4-bit ripple adder using half-adders/full-adders. 7M

OR

10. a) Design a BCD-to-excess-3 code converter with a BCD-to-decimal decoder and OR gates. 7M

    b) Draw the logic diagram of a 4-bit ALU and explain. 7M

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Hall Ticket Number :										

R-15

Code: 5G253

III B.Tech. I Semester Supplementary Examinations May 2019

Power Electronics

(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. Explain the switching characteristics of thyristor during its turn on and turn off process with clear waveform. 14M

OR

2. a) Explain the dynamic behaviour of power IGBT with relevant waveforms. 10M
   b) Describe the significance of RBSOA diagram of a power transistor 4M

UNIT–II

3. Explain in detail various triggering circuits that can be employed in a thyristor circuit. 14M

OR

4. a) Explain how selection of particular heat sink affects the average forward current rating of a thyristor 4M
   b) Describe briefly about the different commutation techniques used for the commutation of thyristors 6M
   c) How is the gate of a thyristor protected against overcurrents and over voltages 4M

UNIT–III

5. With the help of a circuit diagram explain the operation of a dual converter 14M

OR

6. Discuss the effect of source inductance on the performance of single phase full converter. Derive the expression for its output voltage 14M

UNIT–IV

7. Give the classification of choppers based on quadrants; also give their circuit diagrams along with a brief description of operation. 14M

OR

8. a) Explain the various control strategies that are employed in chopper circuits 6M
   b) Derive the average load current in a stepup chopper 8M

UNIT–V

9. Discuss the functioning of three phase voltage source inverter in 120" operating mode with its waveforms 14M

OR

10. a) A single phase full wave ac voltage controller feeds a load of R= 20Ω with an input voltage of 230V, 50Hz For a firing angle 45^{o}, calculate (i) rms value of output voltage and (ii) Load power and input power factor 8M
    b) Discuss the principle of phase control in single phase full wave ac voltage regulator with R load. 6M

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