Hall Ticket Number :										

R-17

Code: 7G251

III B.Tech. I Semester Supplementary Examinations December 2020

AC Machines-II

(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) Explain the futures of salient pole and round rotor machines. 7M

   b) A 3-phase, 4-pole, 24 slot alternator has its armature coils short pitched by one slot. Determine distribution and pitch factors. 7M

OR

2. a) What are the factors effecting the construct of alternator seize w.r.t excitation. 7M

   b) A 3-phase, 6 pole, star-connected alternator rotates at 1000 rpm. The stator has 96 slots and 10 conductor per slot. The flux per pole is 0.045 wb (distributed sinusoidal). Calculate the voltage generated by the machine if the winding factor is 0.95. 7M

UNIT–II

3. a) What is voltage regulation and explain how to calculate voltage regulation using Z.P.F method . 7M

   b) A 3 phase star connected alternator is rated at 1500 kVA, 12000 V. The armature effective resistance and synchronous reactance are 2 ohm and 3.5 ohm respectively per phase. Calculate the % regulation for a load of 1200 kW at (i) 0.8 lagging pf (ii) 0.8 leading pf. 7M

OR

4. a) Explain the two reaction theory of alternator with the help of phasor diagrams. 7M

   b) Explain what is SCR and its significance. 7M

UNIT–III

5. a) What is synchronization and derive expression for synchronizing power and torque. 7M

   b) A 2-pole, 50 Hz, 3 phase, turbo alternator is excited to generate the bus-bar voltage of 11 kV on no-load. The machine is star connected and the short circuit current for this excitation is 1000 A. Calculate the synchronizing power per degree of mechanical displacement of the rotor and the corresponding Synchronizing torque. 7M

OR

6. a) Explain effect of change in mechanical power input on parallel operation of two alternators with neat diagrams. 7M

   b) Two alternators working in parallel supply a lighting load of 3000 kW and a motor load aggregating to 5000 kW at a p.f 0.72. One machine is loaded up to 5000 kW at 0.8 p.f lagging. What is the load and power factor of the other machine? 7M

UNIT–IV

7. a) Explain the synchronous induction motor and give applications 7M

   b) A 440V, 50 Hz,3 phase circuit takes 18 A at a lagging power factor of 0.8 A synchronous motor is used to raise the power factor to unity. Calculate the kVA input to the motor and its power factor when driving a mechanical load of 6 kW. The motor has an efficiency of 88%. 7M

OR

8. a) Explain how the graph between p.f and field current can be obtained from the V and inverted V curves of a synchronous motor. 7M

   b) A 6-pole synchronous motor has an armature impedance of 10 ohm and a resistance of 0.5 ohm. When running on 2000 V, 25 Hz supply its field excitation is such that the EMF induced in the machine is 1600 V. Calculate the maximum total torque in Newton-meter developed before the motor drops out of synchronism. 7M

UNIT–V

9. a) What is double field revolving theory explain with the help of neat diagram. 7M

   b) Explain the construction and applications of stepper motor. 7M

OR

10. a) Explain principle and performance of AC series motor and list out its applications. 7M

    b) Explain the principal and performance of universal motor and give its applications. 7M

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Hall Ticket Number :										

R-17

Code: 7G252

III B.Tech. I Semester Supplementary Examinations December 2020

Electrical and Electronics Measurements

(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) Systematic errors can be classified as (i) Instrumental errors (ii) Environmental errors (iii) Observational errors.

   Discuss the above types of errors giving suitable examples. Explain the measures taken to minimize these errors? 12M

   b) The value of the resistor is specified as 500Ω±10% by a manufacturer. Find the limits of resistance between which the value is guaranteed? 2M

OR

2. a) Describe the working of a universal shunt uses for multi-range ammeters. Derive expressions for resistances of different sections of a universal shunt used for a 3 range ammeter? 10M

   b) Design an Ayrton shunt to provide an ammeter with current range 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? 4M

UNIT–II

3. a) Describe the method for measurement of reactive power in single phase circuits? 7M

   b) Describe the construction and working of a two element induction type energy meter? 7M

OR

4. a) Describe the construction and working of 3 phase alternating field power factor meter. Explain the advantages and disadvantages of moving iron type power factor meters? 10M

   b) An energy meter is designed to make 100 revolutions of disc for one unit of energy. Calculate the number of revolutions made by it when connected to load carrying 40 A at 230 V and 0.4 power factor for an hour. If it actually makes 360 revolutions, find the percentage error? 4M

UNIT–III

5. a) What are the different methods of measurement of frequency in the power frequency range? Explain the working of a mechanical resonance type frequency meter? 10M

   b) Enumerate the applications of a.c. potentiometers? 4M

OR

6. a) Describe the construction and working of a polar type potentiometer. How it is standardized? What are the functions of the transfer instrument and the phase shifting transformer? 10M

   b) A coordinate type potentiometer is used for determination of impedance of a coil and the results obtained are:

   Voltage across a 1.0Ω resistor in series with the coil: +0.238 V on in phase dial and – 0.085 V on quadrature dial.

   Voltage across a 10:1 potential divider used with the coil: +0.3375 V on in phase dial and +0.232 V on quadrature dial.

   Calculate the resistance and reactance of the coil? 4M

UNIT–IV

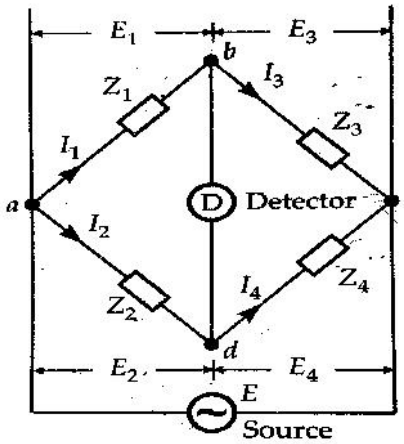
7. a) Describe the substitution method of measurement of medium resistances. List the factors on which the accuracy of the method depends? 10M

   b) Calculate insulation resistance of a cable in which the voltage falls from 100 to 80 V in 20 S. The capacitance is 300 pF? 4M

OR

8. a) Explain how Wien's bridge can be used for experimental determination of frequency. Derive the expression for frequency in terms of bridge parameters? 7M

   b) An a.c. bridge circuit working at 1000 Hz is shown. Arm ab is a 0.2μF pure capacitance; arm bc is a 500Ω pure resistance; arm cd contains an unknown impedance and arm da has a 300Ω resistance in parallel with 0.1μF capacitor. Find the R and C or L constants of arm cd considering it as a series circuit?



7M

UNIT–V

9. a) Describe the principle of working and circuit diagram of a digital oscilloscope? 7M

   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? 7M

OR

10. a) Explain the operation of digital Tachometer with the help of neat sketch? 7M

    b) Describe how the following measurements can be made with the use of a CRO (i) frequency (ii) phase angle? 7M

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Hall Ticket Number :										

R-17

Code: 7G253

III B.Tech. I Semester Supplementary Examinations December 2020

Electrical Power Transmission

(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 the expression for the capacitance of a transposed unsymmetrical 3 phase system? 7M

   b) A conductor consists of seven identical strands each having a radius of r. Determine the factor by which r should be multiplied to find the self GMD of the conductor. 7M

OR

2. a) What are bundled conductors? Discuss the merits and demerits of bundled conductors. 7M

   b) Derive the expression for the capacitance of a conductor in a double circuit hexagonal spaced three phase system? 7M

UNIT–II

3. a) What are various parameters of a transmission line and how they are considered for different lines? 6M

   b) A three-phase line delivers 3600 kW at a power factor 0.8 lagging to a load. If the sending end voltage is 33 kV, determine i) receiving end voltage ii) line current iii) transmission efficiency. The resistance and reactance of each conductor is 5.31Ω and 5.54Ω respectively. 8M

OR

4. a) Draw the vector diagrams of nominal-π and nominal T models of medium transmission line. Derive the expression for voltage regulation of both the models. 7M

   b) An overhead single phase delivers 1.1MW at 33 kV at 0.9 power factor lagging .The total resistance of the line is 10Ω and the total inductive reactance is 15Ω. Determine

   (i) %voltage regulation (ii) sending end power factor (iii) transmission efficiency. 7M

UNIT–III

5. a) Explain the surge impedance loading with necessary expressions. 5M

   b) A 3-phase transmission line is 480km long and serves a load of 400MVA, 0.8p.f lag at 345kV. The ABCD constants of the line are A=D=0.818∠1.30; B=172.2∠84.20; C=0.001933∠90.40 mhos. Determine the sending end line to neutral voltage, the sending end current and the percent voltage drop at full load. 9M

OR

6. a) Analyze the long transmission line by rigorous solution?. 7M

   b) Derive the A, B, C, D constants when two transmission lines are connected in cascade? 7M

UNIT–IV

7. a) Discuss the phenomenon of wave reflection and refraction. Derive expression for reflection and refraction coefficients. 7M

   b) A 200 kV, 3 μs, rectangular surge travels on a line of surge impedance of 400ohms. The line is terminated in a capacitance of 3000 pF. Find an expression for voltage across the capacitance. 7M

OR

8. a) What is corona? Show that the maximum critical disruptive voltage occurs when the radius of conductor is d/e where d is the distance between conductors. 7M

   b) In a 3-phase overhead line, the conductors have an overall diameter of 3.0 cm each and are arranged in delta formation. Assuming a critical disruptive voltage of 250 kV between lines and an air density factor of 0.90 and m_0=0.95, find the minimum spacing between conductors allowable, assume fair weather conditions. 7M

UNIT–V

9. a) Define string efficiency? Why is it necessary to have high string efficiency? 7M

   b) A transmission line has a span of 150m between level supports. The line conductor has a cross-sectional area of 1.25 sq.cm and it weighs 120 kg per 100 meters. If the breaking stress of the copper conductor is 4220 kg per sq.cm. Calculate the maximum sag for a safety factor of 4. Assume a maximum wind pressure of 90 kg per square meter of projected surface. 7M

OR

10. a) Derive the condition for economical core diameter of a cable. 5M

    b) A 66 kV concentric cable with two inter sheaths has a core diameter of 2.3cm, dielectric material of 3.5 mm thickness constitutes three zones of insulation. Determine the maximum stress in each of the three layers, if 22 kV is maintained across each of the inner two layers. 9M

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Hall Ticket Number :										

R-17

Code: 7GC51

III B.Tech. I Semester Supplementary Examinations December 2020

Environmental Science

(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) Illustrate that Environmental science is multi-disciplinary in nature? 7M

   b) Explain the need to protect environment? 7M

OR

2. a) What is the role of people and institutions in understanding the environment? 7M

   b) Evaluate the causes of global environmental issues? 7M

UNIT–II

3. a) Compare the modern agriculture with traditional agriculture? 7M

   b) Explain the forest resources? 7M

OR

4. a) Discuss the causes for land degradation and soil erosion? 7M

   b) Enumerate the individuals' role in conservation of natural resources? 7M

UNIT–III

5. Define Ecosystem? Explain the structure and function of an ideal ecosystem? 14M

OR

6. a) Explain

   i) Hydrological cycle ii) Nitrogen cycle 7M

   b) What is bio diversity? Explain the values of biodiversity? 7M

UNIT–IV

7. a) Summarize the causes and control measures of Air pollution? 7M

   b) Describe the causes and effects of thermal pollution? 7M

OR

8. a) Define pollution? Describe the causes of soil pollution? 7M

   b) Explain the solid waste management practices? 7M

UNIT–V

9. a) Explain i) Acid rains ii) Ozone layer depletion 7M

   b) Summarize the salient features of Environmental protection act? 7M

OR

10. a) Discuss the impact of population on environment? 7M

    b) Elaborate the rain water harvesting techniques? 7M

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Hall Ticket Number :										

R-17

Code: 7G254

III B.Tech. I Semester Supplementary Examinations December 2020

Power Electronics

(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) Explain the principle of operation of SCR. Also list the applications of SCR. 7M

   b) A string of four series-connected thyristors is provided with static and dynamic equalizing circuits. This string has to withstand an off state voltage of 10 kV. The static equalizing resistance is 25000 Ω and the dynamic equalizing circuit has RC = 40 Ω and C = 0.08 μF. The leakage currents for four thyristors are 21 mA, 25 mA, 18 mA and 16 mA respectively. Determine voltage across each SCR in the off-state and the discharge current of each capacitor at the time of turn-on. 7M

OR

2. a) Draw the dynamic characteristics of SCR and explain different switching times. 7M

   b) Explain the V-I characteristics of the Silicon controlled rectifiers with neat waveforms? 7M

UNIT–II

3. a) Explain in detail the two transistor analogy of an SCR. 7M

   b) Write the short notes on the

      (i) Gate protection

      (ii) Ratings of SCRs 7M

OR

4. a) Explain the specifications and ratings of the SCR's and how the improving the dv/dt rating with the help of cathode short is taken place? 7M

   b) Explain the over voltage protection of the circuit by metal oxide varistors? 7M

UNIT–III

5. a) Explain the operation of a un controlled single phase rectifier with RL load and sketch the associated waveforms? 7M

   b) What are dual converters? What are their applications? Explain the operation of a three-phase dual converter. 7M

OR

6. a) Explain the operation of three phase three pulse bridge converter feeding a resistive load, with neat waveforms. 7M

   b) A single phase bridge converter feeds an R-L load having a resistance of 5.5 ohms and an inductance of a very large value causing perfect smoothing. The converter is fed from a 400 V, 50 Hz single phase supply. For a firing angle of α=30° , determine: (i) The average value of output current. (ii) The rms value of output current. (iii) The average and rms thyristor currents. (iv) The power factor or the ac source. 7M

UNIT–IV

7. a) Explain the working of two quadrant or type C chopper with suitable voltage and current waveforms. Give the complete time domain analysis of type C chopper. 7M

   b) A chopper operating on TRC constant frequency principle is feeding a dc series motor having an armature resistance of 0.06 ohm and a field resistance of 0.03 ohm. The average circuit current is 15A and the chopper frequency is 500 Hz. The back emf of the motor is 100V. Find the periods of conduction and blocking. The chopper input is 200V 7M

OR

8. a) With a neat circuit diagram, explain the principle of operation of a boost converter and differentiate the both boost and buck converter? 7M

   b) Explain the operation of a single phase full wave converter with R and RL load and derive all the necessary equations. 7M

UNIT–V

9. a) What are different applications of ac voltage controllers? Explain the operation of single-phase ac voltage controller with R-load. 7M

   b) Explain the external and internal control methods of the Single phase inverters? 7M

OR

10. a) What do you mean by voltage source and current source inverters? Explain the basic operation of a single phase voltage source inverter. 7M

    b) Derive the RMS load voltage and current for the single phase midpoint cyclo converter for RL loads? 7M

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