| Hall Ticket Number : | | | | | | | | | | |
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**R-14**

**Code: 4G254**

III B.Tech. I Semester Supplementary Examinations August 2021

# 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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| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | a) | Discuss the operation of PMMC instrument with neat sketch | 10M | | 2 |
| | b) | A 50A, 230V, meter on full load makes 61 revolutions in 37 seconds. If the normal disc speed is 500 revolution per Kwh find the % error. | 4M | 1 | 3 |
| | | **OR** | | | |
| 2. | a) | Explain the working of a moving iron type instruments. Derive the expression for Torque produced. | 10M | 1 | 2 |
| | b) | Define the following torques. i) Deflection Torque ii)Control Torque iii)Damping Torque | 4M | 1 | 2 |
| | | **UNIT–II** | | | |
| 3. | a) | Discuss the working principle of Dynamometer type wattmeter with its constructional diagram and derive the expressions. | 10M | 2 | 2 |
| | b) | List out the methods used for wattmeter calibration | 4M | 2 | 2 |
| | | **OR** | | | |
| 4. | | Discuss the working principle of Induction type energy meter with neat sketch and draw the phasor diagram. | 14M | 2 | 2 |
| | | **UNIT–III** | | | |
| 5. | a) | Describe the Construction diagram and operation of AC potentiometer | 10M | 3 | 2 |
| | b) | Distinguish between AC and DC Potentiometers. | 4M | 3 | 1 |
| | | **OR** | | | |
| 6. | | Explain the construction and working of Weston type frequency meter along with a neat diagram.. | 14M | 3 | 2 |
| | | **UNIT–IV** | | | |
| 7. | a) | Kelvin double bridge is balanced with the following constants: outer ratio arm 100ohm & 1000 ohm ; inner ratio arms, 99.92ohm and 1000.6ohm; resistance of link 0.1 ohm, standard resistance 0.00377 ohm. Calculate the value of unknown resistance. | 10M | 4 | 3 |
| | b) | List out the methods used for low resistance measurement. | 4M | 4 | 1 |
| | | **OR** | | | |
| 8. | a) | Draw the Anderson bridge and derive the expression for balancing the bridge | 10M | 4 | 3 |
| | b) | Define the following i)Quality Factor ii)Dissipation factor | 4M | 4 | 1 |
| | | **UNIT–V** | | | |
| 9. | | Discuss about i) Digital frequency meter ii) Digital multimeter iii) Digital Tachometer. | 14M | 5 | 2 |
| | | **OR** | | | |
| 10. | a) | Discuss the construction and working of Digital Storage Oscilloscope along with a neat sketch | 14M | 5 | 2 |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-14**

**Code: 4G253**

III B.Tech. I Semester Supplementary Examinations August 2021

# Power Electronics

( Electrical and Electronics Engineering )

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit ( 5x14 = 70 Marks )

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| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | a) | Explain the various turn-on methods of SCRs. | 7M | CO1 | L2 |
| | b) | How do you known turn ON and turn OFF times from the switching characteristics? Explain. | 7M | CO2 | L4 |
| | | **OR** | | | |
| 2. | a) | What are the problems associated with firing of parallel connected SCRs? Draw and explain circuit for firing of parallel connected SCRs | 7M | CO1 | L2 |
| | b) | Draw and explain the necessity of static and dynamic equalizing circuit for series connected SCRs? | 7M | CO1 | L2 |
| | | **UNIT–II** | | | |
| 3. | a) | Explain the two-transistor analogy of SCR. | 7M | CO2 | L2 |
| | b) | Explain over voltage protection of SCRs using Metal Oxide Varistors. | 7M | CO2 | L2 |
| | | **OR** | | | |
| 4. | a) | What is the need for a resistor in series with capacitor in snubber circuit of SCR. Explain with neat circuit diagram? | 7M | CO2 | L2 |
| | b) | The specifications of a thyristor operating at a peak voltage of 500V are: Repetitive peak current=250A, $(di/dt)_{max}$=60A/µs, $(dv_a/dt)_{max}$=200V/µs. Take a factor of safety for the three specifications mentioned above. Design a snubber circuit if the minimum load resistance is 20Ω. | 7M | CO6 | L3 |
| | | **UNIT–III** | | | |
| 5. | a) | What is the effect of source inductance in single phase full wave controlled bridge rectifier with *RL* load? Draw the voltage and current waveforms. | 7M | CO3 | L2 |
| | b) | Explain the working of three phase semi converter with relevant wave forms with highly inductive load for firing angle of $30^0$. | 7M | CO3 | L2 |
| | | **OR** | | | |
| 6. | a) | What is phase angle controlled technique? Explain the operation of single phase, phase angle controlled rectifier. Derive the expression for average dc output voltage with relevant waveforms. | 14M | CO3 | L2 |
| | | **UNIT–IV** | | | |
| 7. | a) | Explain with neat circuit diagram and waveforms the working of class A chopper. | 7M | CO4 | L2 |
| | b) | A class-A chopper circuit has a load resistance of 100 ohms, capacitance of 10 micro farads and inductance of 10 mH. Find the time for which thyristor will remain in ON state. What will be the turn ON time if the load resistance is decreased to 25 ohms? | 7M | CO6 | L3 |
| | | **OR** | | | |
| 8. | a) | Explain the operating principle of dc chopper with a suitable diagram. Derive expressions for average output voltage and rms output voltage. | 7M | CO4 | L2 |
| | b) | Explain how thyristor is commutated in class-B chopper. What are disadvantages of this commutation circuit? | 7M | CO4 | L2 |
| | | **UNIT–V** | | | |
| 9. | a) | What are pulse width modulated inverters? What are the different PWM techniques used in inverter? | 7M | CO5 | L2 |
| | b) | Draw the single phase bidirectional ac voltage controller with *R* load and explain its working principle with waveforms. | 7M | CO5 | L2 |
| | | **OR** | | | |
| 10. | a) | Explain the working of a 1-phase full bridge Inverter with RL load. Draw the relevant output waveforms. | 7M | CO5 | L2 |
| | b) | A 50 Hz single phase full bridge produces a square wave voltage across load when operating from a 300 V DC supply, the AC load consists of a resistance of 30 Ω in series with inductance 15 mH. Determine the frequencies and rms values of the lowest order harmonics in the AC load current. | 7M | CO6 | L3 |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-14**

**Code: 4G252**

III B.Tech. I Semester Supplementary Examinations August 2021

# Transmission of Electric Power

( Electrical and Electronics Engineering )

Max. Marks: 70 Time: 3 Hours

Answer *any five* full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | a) | Derive the expression for capacitance of a single phase overhead line. | 7M | | BL3 |
| | b) | Find out the capacitance of single phase line of 30km long consisting of two parallel wires each 15mm diameter and 1.5m apart. | 7M | CO1 | BL3 |
| | | **OR** | | | |
| 2. | | Derive the capacitance calculations for symmetrical and asymmetrical single transmission lines from fundamentals. | 14M | CO1 | BL3 |
| | | **UNIT–II** | | | |
| 3. | | A 3 phase 100km line has the following constants. Resistance/phase/km =0.153 ohm, inductance/phase /km=1.21mH, Capacitance/phase /km= 0.00958μF. If the line supplies a load of 20MW at 0.9 pf lagging at 110kV at the receiving end calculate sending end current, sending end power factor, regulation and transmission efficiency using nominal T method. | 14M | CO2 | BL3 |
| | | **OR** | | | |
| 4. | | Draw the nominal T circuit of a medium length transmission line and derive expression for sending end voltage and current. Also draw the respective phasor diagram. | 14M | CO2 | BL3 |
| | | **UNIT–III** | | | |
| 5. | | Using rigorous method, derive expression for sending end voltage and current for a long transmission line. | 14M | CO3 | BL3 |
| | | **OR** | | | |
| 6. | | Explain the concepts of Skin, Proximity and Ferranti effects in detail with illustrations. | 14M | CO3 | BL2 |
| | | **UNIT–IV** | | | |
| 7. | a) | Prove that a transmission line conductor between two supports at equal heights takes the form of a catenary. | 7M | | BL3 |
| | b) | What is sag template? Explain how this is useful for location of towers and stringing of power conductors. | 7M | CO4 | BL2 |
| | | **OR** | | | |
| 8. | | Derive an expression for sag of a line supported between two supports of the same height. Also Explain the effect of ice and wind loading. | 14M | CO4 | BL3 |
| | | **UNIT–V** | | | |
| 9. | a) | Describe the general construction of an underground cable with a neat sketch. | 7M | | BL2 |
| | b) | A single core cable used on 33kV, 50Hz has conductor diameter 10mm and inner diameter of sheath 25mm. The relative permittivity of insulating material used is 3.5. Find (1) Capacitance of the cable per km (2) Maximum and minimum electrostatic stress in the cable (3) Charging current per km. | 7M | CO5 | BL3 |
| | | **OR** | | | |
| 10. | a) | Explain any four insulating materials used in manufacturing cable. | 7M | | BL2 |
| | b) | Find the economic size of a single core cable working on a 132kV three phase system, if a dielectric stress of 60KV/cm can be allowed. | 7M | CO5 | BL2 |

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