| Hall Ticket Number : | | | | | | | | | | |
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**R-15**

**Code: 5G254**

III B.Tech. I Semester Supplementary Examinations February 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) | Derive the Torque equation of MI instruments with its advantages and disadvantages. | 10M | 1 | 2 |
| | b) | Distinguish between Moving Coil and Moving Iron Instruments. | 4M | 1 | 3 |
| | | **OR** | | | |
| 2. | a) | A Permanent magnet moving coil of dimensions 15mm X 12mm. Flux density in the air gap is 1.8 x $10^{-3}$ wb/$m^2$ and the spring constant is 0.14x$10^{-6}$ Nm/rad. Determine the number of turns required to produce angular deflection of 90degree when a current of 5mA is flowing through a coil. | 10M | 1 | 2 |
| | b) | Explain the classification of an analog instrument with an example | 4M | 1 | 2 |
| | | **UNIT–II** | | | |
| 3. | a) | What is the necessity of Power factor meters? Discuss the operation of Low power factor meter with neat sketch. | 10M | 2 | 2 |
| | b) | Explain about Creeping error in single phase induction type energy meter | 4M | 2 | 2 |
| | | **OR** | | | |
| 4. | | Derive the expression for deflecting and controlling torque for a single phase dynamometer wattmeter along with a neat diagram. | 14M | 2 | 4 |
| | | **UNIT–III** | | | |
| 5. | a) | Describe the Construction and operation of Crompton's potentiometer. | 10M | 3 | 2 |
| | b) | What are the applications of DC potentiometers? Discuss any one with circuit diagram. | 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) | How capacitance is measured using Schering bridge. Derive the expression for unknown capacitance. | 7M | 4 | 3 |
| | b) | Draw the Wein's bridge and derive the balance condition | 7M | 4 | 1 |
| | | **OR** | | | |
| 8. | a) | Draw the neat sketch of Anderson's bridge and derive the bridge balance condition. | 10M | 4 | 3 |
| | b) | In Maxwell's inductance –capacitance bridge the values of arms at balance are R2=200Ω ,R3=300 Ω , R4=500 Ω and C4=0.5 μF. Calculate the values of R1 and L1. | 4M | 4 | 1 |
| | | **UNIT–V** | | | |
| 9. | | Discuss the Lissajous pattern for the Measurement of phase, frequency, current & voltage. | 14M | 5 | 2 |
| | | **OR** | | | |
| 10. | | 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-15**

**Code: 5G251**

III B.Tech. I Semester Supplementary Examinations February 2021

# Electrical Machines-III

( 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 in detail about the constructional features of round rotor synchronous machines.
   b) An alternator has 18 slots/pole and first coil lies in slots 1 and 16. Calculate the pitch factor for (i) Fundamental (ii) 3rd harmonics (iii) 5th harmonics

**OR**

2. a) Derive the generalized expression for an induced emf/ph in 3-ph alternator having fractional pitch and distributed winding.
   b) A three phase, 50 Hz Y connected alternator has a double layer winding distributed in 36 slots, each slot containing 16 conductors. The flux per pole is 0.04 wb. Evaluate the terminal emf at open circuit.

**UNIT–II**

3. a) Write a short note on armature resistance, synchronous reactance and impedance
   b) Discuss the procedural steps to be followed for finding the voltage regulation of alternator using MMF method.

**OR**

4. a) Write a short note on armature winding terminology.
   b) A salient pole alternator has d-axis and q-axis reactance of 0.8pu and 0.5pu respectively. The effective resistance is 0.02pu. Compute percentage regulation when the generator is delivering rated load at 08 p.f lead.

**UNIT–III**

5. a) What is an infinite bus? Mention the conditions to be satisfied prior to synchronizing an alternator to infinite bus bar.
   b) A 10MVA 3-ph alternator has a reactance of 20%. Calculate the total synchronizing power of armature per mechanical degree of phase displacement when running in parallel on 10KV, 50Hz bus at 1500rpm.

**OR**

6. a) Discuss the effect of change of excitation of alternator when it is connected to Infinite bus bar.
   b) Derive the load currents shared by two similar alternators when they are connected in parallel.

**UNIT–IV**

7. Develop the mathematical expression of power developed by synchronous motor. Also derive the condition for maximum power developed.

**OR**

8. a) Describe how the synchronous motor can operate as synchronous condenser
   b) A 400V, 50Hz, 33.7KW, 3 ph star connected SM has a full load efficiency of 88%. The synchronous impedance of motor is (0.2 +j1.6) Ω/ph. If the motor excitation is adjusted to give a leading p.f of 0.9. Calculate line induced e.m.f.

**UNIT–V**

9. Explain about capacitor start capacitor run motors of a single phase induction motor. Draw its torque-slip characteristics. Also mention its merits and demerits.

**OR**

10. a) Explain the principle of operation of single phase induction motor.
    b) Explain the operating principle of shaded pole motor.

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| Hall Ticket Number : | | | | | | | | | | |
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**R-17**

**Code: 7GC51**

III B.Tech. I Semester Regular & Supplementary Examinations February 2021

# 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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| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | a) | Categorize different components of environment and explain briefly. | 7M | 1 | 4 |
| | b) | Explain the role of famous personalities and institutions in protection of environment. | 7M | 1 | 2 |
| | | **OR** | | | |
| 2. | a) | Outline various segments of environment. | 7M | 1 | 4 |
| | b) | Summarize the need of public awareness about environment. | 7M | 1 | 3 |
| | | **UNIT–II** | | | |
| 3. | a) | Classify renewable natural resources and explain their potential contribution to energy sector. | 7M | 2 | 4 |
| | b) | Enumerate the impacts of overgrazing | 7M | 2 | 3 |
| | | **OR** | | | |
| 4. | a) | Differentiate traditional and modern agriculture. Analyse the effects of each type on environment. | 7M | 2 | 3 |
| | b) | Explain the impacts of construction of dam on environment. | 7M | 2 | 2 |
| | | **UNIT–III** | | | |
| 5. | a) | With neat sketch Illustrate Nitrogen cycle. | 7M | 3 | 3 |
| | b) | Discuss the salient features of desert ecosystem. | 7M | 3 | 3 |
| | | **OR** | | | |
| 6. | a) | Briefly explain threats to biodiversity with examples. | 7M | 3 | 3 |
| | b) | Compare In-situ and Ex-Situ conservation of biodiversity. | 7M | 3 | 3 |
| | | **UNIT–IV** | | | |
| 7. | a) | Define noise. Discuss causes, effects and control measures of noise pollution. | 7M | 4 | 2 |
| | b) | Illustrate with neat sketch, adverse effects of Thermal Stratification on aquatic biota. | 7M | 4 | 3 |
| | | **OR** | | | |
| 8. | a) | Enumerate the effects of air pollution on animals and plants. | 7M | 4 | 2 |
| | b) | Briefly discuss causes and effects of soil pollution. | 7M | 4 | 3 |
| | | **UNIT–V** | | | |
| 9. | a) | With neat sketch illustrate any two rain water harvesting techniques. | 7M | 5 | 3 |
| | b) | Explain the importance of environmental ethics in education. | 7M | 5 | 2 |
| | | **OR** | | | |
| 10. | a) | Illustrate with equations causes and effects of acid rain. | 7M | 5 | 3 |
| | b) | Enumerate the salient features of wildlife protection act. | 7M | 5 | 2 |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-15**

**Code: 5G359**

III B.Tech. I Semester Supplementary Examinations February 2021

# 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) What are the different package types and temperature ranges of IC's 6M
   b) How the op-amp acts as V-I and I-V converter? 8M

**OR**

2. a) Explain the working of triangular wave generator using op-amp. 7M
   b) Write a detailed note on the following
      i) Slew Rate ii) CMRR 7M

## UNIT–II

3. a) Draw IC 555 timer functional diagram and explain its function. 7M
   b) Draw PLL block diagram and briefly explain the operation of each block. 7M

**OR**

4. Describe the operation of monostable multivibrator using IC 555 timer. Draw the necessary waveforms and derive the time constant equation. 14M

## UNIT–III

5. Give a detailed list of CMOS, TTL & ECL logic families. 14M

**OR**

6. a) Construct CMOS inverter circuit and explain the different regions of operation using its transfer characteristics.. 7M
   b) Draw and explain the operation of 2-input CMOS NAND gate. 7M

## UNIT–IV

7. a) Explain the operation of full adder with truth tables. 6M
   b) With an example explain the operation of IC 75X85. 8M

**OR**

8. Examine the function of priority encoder with truth table. And draw pin diagram and logic diagram of IC 74X148 14M

## UNIT–V

9. a) Compare combinational and sequential logic circuits. 7M
   b) Explain about race around condition and how it can be reduced? 7M

**OR**

10. Draw pin and logic diagrams of IC 74X198 and give a detailed operation. 14M

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| Hall Ticket Number : | | | | | | | | | | |
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**R-15**

**Code: 5G253**

III B.Tech. I Semester Supplementary Examinations February 2021

# 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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| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | a) | Explain the switching characteristics of SCR briefly? | 7M | CO1 | L2 |
| | b) | Draw the gate characteristics of a SCR and explain its importance in the design of gate drive circuit? | 7M | CO1 | L2 |
| | | **OR** | | | |
| 2. | a) | What are the limitations of R-triggering circuit | 7M | CO1 | L2 |
| | b) | With neat circuit diagram and waveforms explain the operation of RC firing circuit. | 7M | CO1 | L2 |
| | | **UNIT–II** | | | |
| 3. | a) | Explain over current and over voltage protection in SCR. | 7M | CO2 | L2 |
| | b) | Write short notes on protection against noise signals in gate and thermal protection of SCR | 7M | CO2 | L2 |
| | | **OR** | | | |
| 4. | a) | With a neat circuit diagram explain complete SCR protection scheme. | 7M | CO2 | L2 |
| | b) | Write short notes on high di/dt and high dv/dt protection for reliable operation of SCR | 7M | CO2 | L2 |
| | | **UNIT–III** | | | |
| 5. | a) | Explain the operation of single phase full-wave controlled rectifier using center tapped transformer with R-L load under continuous mode of operation. Draw the waveforms of output voltage, voltage across SCR and average load current for $\alpha = 45^0$. | 7M | CO3 | L2 |
| | b) | A single phase half controlled bridge converter is connected to R-L load with R = 10 Ω and L = 6 mH. The converter is supplied from 230 V, 50 Hz ac supply. Determine average and rms load current. | 7M | CO6 | L4 |
| | | **OR** | | | |
| 6. | | Draw the circuit diagram of three phase full wave controlled rectifier with *RL* load and explain its operating principle with voltage and current waveforms. Determine the following parameters for *RL* load with firing angle $\alpha = 30^o$ : i) dc output voltage ii) Average dc load current iii) rms output voltage iv) rms load current v) Ripple factor | 14M | CO6 | L3 |
| | | **UNIT–IV** | | | |
| 7. | a) | Explain the different control strategies in DC-DC choppers? | 7M | CO4 | L2 |
| | b) | Discuss the principle of operation of four quadrant chopper. | 7M | CO4 | L2 |
| | | **OR** | | | |
| 8. | | Explain class A and class C choppers operation with neat circuit diagrams | 14M | CO4 | L2 |
| | | **UNIT–V** | | | |
| 9. | a) | Explain the operation of single phase bridge inverter with the help of load voltage and load current waveforms for R-L Load. | 7M | CO5 | L2 |
| | b) | Distinguish between an ac voltage controller and a cyclo-conveter. | 7M | CO5 | L2 |
| | | **OR** | | | |
| 10. | a) | Compare VSI and CSI. | 7M | CO5 | L1 |
| | b) | Draw the circuit and explain the operation of 1-ϕ to 1-ϕ step down cyclo-converter with R-load for $f_o=(1/3)f_s$. Indicate the conduction of each device. | 7M | CO5 | L3 |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-15**

**Code: 5G252**

III B.Tech. I Semester Supplementary Examinations February 2021

# Transmission of Electrical 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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| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | | Derive the expression for inductance of three phase line with unsymmetrical spacing. | 14M | CO1 | BL3 |
| | | **OR** | | | |
| 2. | a) | Calculate the GMR of a conductor having seven strands each of 3mm radius. | 7M | | BL3 |
| | b) | Explain why and how transposition of three phase lines are done | 7M | CO1 | BL2 |
| | | **UNIT–II** | | | |
| 3. | | A 50Hz, 3 phase transmission line 30km long has a total series impedance of (40+j125) and shunt admittance of ($10^{-3}$j) mho. The load is 50MW at 220kV with 0.8pf lag. Find the sending end voltage, current, power factor, efficiency and regulation using nominal π-method. | 14M | CO2 | BL3 |
| | | **OR** | | | |
| 4. | a) | With reference to long transmission lines, gives the physical interoperation of the following terms (i) Characteristics impedance (ii) Surge impedance (iii) Surge impedance loading (iv) Propagation constant. | 7M | | BL2 |
| | b) | Derive the ABCD constants of medium transmission line with π configuration. | 7M | CO2 | BL3 |
| | | **UNIT–III** | | | |
| 5. | | Write brief notes on reflected and refracted waves in long length transmission lines with aid of case study. | 14M | CO3 | BL2 |
| | | **OR** | | | |
| 6. | | Determine the efficiency and regulation of a 3 phase 100 km, 50Hz transmission line delivering 20MW at a p.f of 0.8 lagging and 66kV to a balanced load. The conductors are copper, each having resistance 0.1Ω/km,1.5cm outside diameter, spaced equilaterally 2m between centers. Neglect reactance and use (i) Nominal T (ii) Nominal π method. | 14M | CO3 | BL3 |
| | | **UNIT–IV** | | | |
| 7. | | An overhead line at a river crossing is supported from two towers of heights 30 metres and 90 metres above water level with a span of 300 metres. The weight of the conductor is 1 kg/metre and the working tension is 2000 kg. Determine the clearance between the conductor and the water level mid-way between the towers. | 14M | CO4 | BL3 |
| | | **OR** | | | |
| 8. | | Explain about corona and string efficiency. Describe the methods of improving the string efficiency. | 14M | CO4 | BL3 |
| | | **UNIT–V** | | | |
| 9. | | With neat diagram, explain the various methods of grading of underground cables. | 14M | CO5 | BL2 |
| | | **OR** | | | |
| 10. | | A 11kv 3 phase underground feeder, 2km long uses three single core cables. The diameter of each conductor is 28mm and an insulation thickness of 4.4 mm and the relative permittivity of 4. Determine (i) Capacitance of the cable per phase (ii) charging current per phase (iii) total charging KVAR (iv) Dielectric loss per phase if the power factor of unloaded cable is 0.04. | 14M | CO5 | BL3 |

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