Hall Ticket Number :										

R-15

Code: 5G273

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

Instrumentation

(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)

****

UNIT–I

1. a) Explain in detail about the dynamic characteristics of an instrument 7M

   b) Define Periodic and aperiodic signals. Explain the properties? 7M

OR

2. a) Distinguish between static and dynamic characteristics of an instrument? 7M

   b) Explain in detail about pulse modulation? 7M

UNIT–II

3. a) List the different types of data transmission? 7M

   b) Explain land line Telemetry system and describe the advantages? 7M

OR

4. a) Explain the frequency modulation system? 7M

   b) Write the comparison of FM, PM and PAM 7M

UNIT–III

5. a) Explain the working principle of vector impedance meters in detail. 7M

   b) Discuss in detail about the operation of Q meter with neat diagram? 7M

OR

6. List and explain different types of multiplexing systems? 14M

UNIT–IV

7. a) What are the various advantages of electrical transducers? 7M

   b) What is Synchro? With the help of neat sketch explain the operation? 7M

OR

8. a) Explain the construction of a capacitive transducers in detail? 7M

   b) Draw the resistance V_s temperature graph of a thermistor and explain in detail? 7M

UNIT–V

9. a) What is angular velocity? Explain how it is measured? 7M

   b) What are the different instruments that are used to measure torque? Explain about anyone? 7M

OR

10. a) Derive the expression for guage sensitivity of a strain gauge? 7M

    b) Explain the working of Strain gauge type of torque transducer? 7M

****

Hall Ticket Number :										

R-15

Code: 5G276

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

Principles of Power Quality

(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)

****

UNIT–I

1. a) Explain why power quality = voltage quality 7M

   b) Discuss the power quality evaluation procedure 7M

OR

2. Explain the following

   i) voltage imbalance ii) CBEMA and ITI curves 14M

UNIT–II

3. Discuss general classes of power quality problems. What are the various solutions for power quality improvement at the end user level? 14M

OR

4. Explain the

   i) Fundamental principles of protection ii) sources of sags and interruptions 14M

UNIT–III

5. Explain the following terms

   i) Harmonic distortion ii) Harmonic indices iii) Harmonic distortion evaluations 14M

OR

6. Discuss the harmonic sources from commercial loads, harmonic sources from industrial loads and principles of controlling harmonics 14M

UNIT–IV

7. Discuss briefly about the

   i) principles of over voltage protection ii) Capacitors for voltage regulation flicker 14M

OR

8. Explain the following source of transient over voltages

   i) Capacitor switching ii) Lightning iii) ferro resonance 14M

UNIT–V

9. a) Describe the RMS voltage variation indices 7M

   b) Explain the operation of any three power quality measurement equipment 7M

OR

10. a) Explain the power quality monitoring standards 7M

    b) Describe the process of power quality bench marking 7M

****

Hall Ticket Number :										

R-15

Code: 5G271

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

Power Semiconductor Drives

(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)

****

UNIT–I

1. a) Explain the operation of a separately excited DC motor fed by a single-phase semi-converter. Discuss the continues mode of operation with the help of their governing equations. 7M

   b) A Separately excited DC motor has its armature circuit connected to a single-phase semi-converter having 230V, 50Hz, Ra=10 Ohms, with its rated load torque 80N-m at 1000rpm, $K_a\phi$ = 0.8V-s/rad for its armature and field currents, and with zero firing angle for field converter. Determine (i) rated current, (ii) firing angle at rated torque. 7M

OR

2. a) Explain the operation of a separately excited DC motor fed by a three phase full converter. 7M

   b) A 220V, 1440rpm, 120A separately excited DC motor with armature resistance of 0.7 Ω is fed from 3-phase fully controlled converter with an AC source line voltage 440V, 50 Hz supply. A star connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage when converter firing angle is zero. Calculate the value of firing angle when motor is running at 1200 rpm at rated torque. 7M

UNIT–II

3. a) Explain the operation of a four quadrant chopper fed to the D.C series motor and also draw the current and voltage wave forms for continuous current operation. 7M

   b) A 220V, 24A, 1000rpm separately excited DC motor having an armature resistance of 2Ω is controlled by a chopper. The chopping frequency is 500Hz and the input voltage is 230V. Calculate the duty ratio for a motor torque of 1.2 times rated torque at 500rpm 7M

OR

4. Explain how four-quadrant operation is achieved by dual converters, each of 3 phase full wave configuration, for separately excited dc motor. 14M

UNIT–III

5. a) Explain with circuit and waveforms of two quadrant chopper fed separately excited DC motor. 7M

   b) A 230V, 960 rpm and 200A separately excited DC motor has Ra=0.02ohm. The motor is fed from a chopper which provides both motoring and braking operations. Assume continuous conduction. Calculate duty ratio of chopper for motoring and braking operations at rated torque and 350 rpm. 7M

OR

6. a) Derive speed torque expression of class B chopper operation with time ratio control is supplying the armature of the separately excited motor, and draw speed torque characteristics. 7M

   b) Explain the operation of two-quadrant, type D chopper drive. 7M

UNIT–IV

7. a) Discuss speed control of induction motor from stator side with speed-torque curves. 7M

   b) The parameters of a three phase 400 Volts, 50 Hz, 6 pole, 960 rpm, and star connected induction motor has the following parameters per phase referred to the stator. R_1= 0.4 Ohm. R_2 = 0.20 Ohm, X_1 = X_2 =1.5 Ohm, X_m = 30 Ohms. If the motor is controlled by variable frequency control at a constant flux of rated value, determine the motor speed and the stator current at half the rated torque and 25Hz. 7M

OR

8. a) Explain with suitable block diagrams the various types of VSI-controlled induction motor drive. 7M

   b) A 2200V, 2600kW, 735 rpm, 50Hz, 8-pole, 3 Phase squirrel cage induction motor has following parameters referring to the stator side: Rs=0.075 ohms, R'_2=0.1 ohms, Xs=0.45 ohms, X'_r=0.55 ohms. Stator winding is delta-connected and consists of two sections connected in parallel.

      i. Calculate starting torque and maximum torque as a ratio of rated torque. If the motor is started by star delta switching, what is the maximum value of line current during starting?

      ii. What will be the value of maximum line current and torque during starting, if the past winding method of starting is employed? 7M

UNIT–V

9. a) Draw the circuit diagram and explain the working of a slip power recovery system using static Scherbius system for a three phase induction motor. 7M

   b) Explain Static Kramer drive for a three phase induction motor. 7M

OR

10. a) Describe the operation of self-controlled Synchronous Motor drives in detail. 7M

    b) Describe the open-loop and closed loop methods of speed control of a synchronous motor using VSI. 7M

*****

Hall Ticket Number :										

R-15

Code: 5G275

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

Renewable Energy Sources

(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)

****

UNIT–I

1. a) Explain renewable energy sources in detail with a special reference to the Indian context. 7M

   b) Define the following with respect to solar radiation: i) Altitude Angle ii) Zenith Angle iii) Declination Angle iv) Hour Angle 7M

OR

2. a) Briefly explain the instruments used for measuring solar radiation and sun shine. 7M

   b) Explain extraterrestrial and terrestrial solar radiation in detail. 7M

UNIT–II

3. a) Describe various types of solar air heaters with neat schematic diagrams in brief. 7M

   b) What are the different considerations of PV modules to be connected in series and parallel for deciding PV system design? 7M

OR

4. a) Draw a neat sketch of solar flat plate collector and explain its working principle. 7M

   b) Discuss the advantages and disadvantages of flat plate collector 7M

UNIT–III

5. a) Explain the operation wind energy system with a neat sketch 7M

   b) Discuss the merits and demerits associated with wind energy systems. 7M

OR

6. a) Explain the working of mini hydropower plant with a neat layout diagram. 7M

   b) Explain various advantages and disadvantages of tidal energy generation system? 7M

UNIT–IV

7. a) With a neat diagram, explain the working principle of biogas plant 7M

   b) List and explain the factors affecting biogas generation. 7M

OR

8. a) Explain different types of Biogas digesters 7M

   b) Explain the characteristics of biogas and explain how the gas will be used for cooking. 7M

UNIT–V

9. a) What is Direct energy conversion and what is the need for DEC. 7M

   b) What are the principles and limitations of DEC 7M

OR

10. a) Explain the principle of operation of Thermo electric generators. 7M

    b) Briefly explain Joul and Thomson effects. 7M

****

Hall Ticket Number :										

R-15

Code: 5G278

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

Special Electrical 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)

****

UNIT–I

1. a) Explain the operation of series Booster and Shunt Booster in detail. 7M

   b) Describe the operation of Dynamotor with neat sketch. 7M

OR

2. Explain the operation and characteristics of Amplidyne in detail. 14M

UNIT–II

3. Explain the operation of Vernier motor with neat sketch. 14M

OR

4. a) Derive the expression for the torque equation for the synchronous reluctance motor. 7M

   b) Explain the construction and operation of axial and radial flux machines. Discuss the advantages and disadvantages of each construction. 7M

UNIT–III

5. Describe the operation of variable reluctance type stepper motor with different modes of operation. 14M

OR

6. a) Explain with a neat diagram the multistack configuration in stepper motors. 7M

   b) A stepper motor has a step angle of 1.8^0 and is driven at 4000pps. Calculate
      i) Resolution
      ii) Motor speed and
      iii) Number of pulses required to rotate the shaft through 54^0 7M

UNIT–IV

7. Explain in detail about the construction and working principle of PMBLDC motor**.** 14M

OR

8. Derive the torque and EMF equations of PMSM. 14M

UNIT–V

9. Discuss the development of a Double Sided Linear Induction Motor from rotary type induction motor. 14M

OR

10. a) What are the assumptions made in the Field Analysis of Double Sided Linear Induction Motor? 7M

    b) Discuss the Development of one sided Linear Induction Motor with back Iron. 7M

***

Hall Ticket Number :										

R-15

Code: 5G272

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

Distribution 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)

****

UNIT–I

1. a) Derive the relation between load and loss factor. 7M

   b) Define the terms connected load, maximum demand, load factor, plant utilization factor, coincidence factor? 7M

OR

2. Explain various loads and their characteristics? 14M

UNIT–II

3. a) What is distribution system? How is it subdivided to cater the needs of the customers? 7M

   b) Discuss the arrangement of primary and secondary distribution systems? 7M

OR

4. A 230V single phase feeder has resistance and reactance per km is 1.5 +j0.26 ohms. What is the load it can supply with % VD = 5.0, when
   (i) Load is uniformly distributed
   (ii) Located at the feeder end
   (iii) Uniformly decreasing load. Take feeder length is 1.5km. 14M

UNIT–III

5. a) What is a substation and why it is needed. 7M

   b) Explain the criteria for location of substation and size. 7M

OR

6. Explain in detail Bus arrangement and switching systems in substations. 14M

UNIT–IV

7. a) List out the various causes of low power factor and methods of improving power factor. 7M

   b) Derive the most economical power factor and constant Kw load and constant KVA type loads? 7M

OR

8. a) Name the different methods of voltage control and explain the application of series capacitors to feeders for voltage regulation. 7M

   b) Compare and explain the role of shunt and series capacitors in power factor correction. 7M

UNIT–V

9. a) What are the objectives of a distribution protection? 7M

   b) What are the different protective devices used in the distribution system? Give comparison between them? 7M

OR

10. a) What are the different varieties of fuses used of protection? Give the features of HRC fuse and discuss its main advantages? 7M

    b) Explain various schemes for feeder protection. 7M

****

Hall Ticket Number :										

R-15

Code: 5G379

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

Digital Signal Processing

(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)

****

UNIT–I

1. a) Find whether the signal

$$x(n) = \begin{cases} n^2 & 0 \le n \le 3 \\ 10 - n & 4 \le n \le 6 \\ n & 7 \le n \le 9 \\ 0 & otherwise \end{cases}$$

is an energy signal or a power signal. Also find the energy and power of the signal. 6M

b) A discrete time system is represented by the following equation

$y(n) = (3/2)\, y(n-1) - (1/2)\, y(n-2) + x(n)$

with initial conditions $y(-1) = 0$, $y(-2) = -2$ and $x(n) = (1/4)^n u(n)$. Determine the total response of the system. 8M

OR

2. a) Find the linear convolution of the sequences x(n) = { 1, 0, 2 }, h(n) = { 1, 1 }. 7M

b) If the DFT {x(n)} = X(k) = {4, -j2, 0, j2}. Using the appropriate property of DFT, find

i. DFT [x{n - 2}]

ii. DFT[x{- n}] 7M

UNIT–II

3. a) Develop the three stages computations for 8-point sequence using Radix-2 DIT-FFT algorithm and draw the butterfly diagram. 7M

b) Given a sequence x(n) = {0, 1, 2, 3, 4, 5, 6, 7}, compute the X(k) using Radix-2 DIT-FFT algorithm. 7M

OR

4. a) Compute DFT of the sequence $x(n) = \cos(n\pi/2)$, where N = 4 using Radix-2 DIF-FFT algorithm. 7M

b) Find the IDFT of the sequence X(k) = {12, 0, 0, 0, 4, 0, 0, 0} using Radix-2 DIF-FFT algorithm. 7M

UNIT–III

5. a) Describe the procedure to design analog Butterworth lowpass filter. 7M

b) For the given specifications design an analog Butterworth filter

$0.9 \le |H(j\Omega)| \le 1$ for $0 \le \Omega \le 0.2\pi$.

$|H(j\Omega)| \le 0.2$ for $0.4\pi \le \Omega \le \pi$. 7M

OR

6. a) Obtain the direct form – I and direct form – II realization of the LTI systems governed by the equation

$y(n) = -(3/8)\, y(n-1) + (3/32)\, y(n-2) + (1/64)\, y(n-3) + x(n) + 3\, x(n-1) + 2\, x(n-2)$ 7M

b) Realize the system with difference equation

$y(n) = (3/4)\, y(n-1) - (1/8)\, y(n-2) + x(n) + (1/3)\, x(n-1)$ in cascade form. 7M

UNIT–IV

7. a) Show that the magnitude response $|H(\omega)|$ of FIR filter is symmetric when impulse response is symmetric and N is odd. 7M

b) Explain the FIR filter design using windowing method. 7M

OR

8. a) Compare the rectangular window, Hanning window and Hamming window techniques. 6M

b) Discuss the frequency sampling method of FIR filter design briefly. 8M

UNIT–V

9. a) Explain spectral analysis of non-stationary signals. 7M

b) How reverberation, echo and chorus effects are added to the music? 7M

OR

10. a) With the help of block diagram explain signal compression and de-compression. 7M

b) Discuss about oversampling A/D conversion in digital signal processing applications. 7M

****