G 5622

Reg. No....................................

Name..

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 705—COMMUNICATION ENGINEERING (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Explain the function of FM detector.

2. Why are synchronising pulses transmitted along with picture signal.

3. What are the factors affecting radar range equation ?

4. Explain the function of uplink/downlink converters.

5. Explain the principle behind digital coding of Analog waves.

$(5 \times 3 = 15$ marks$)$

Part B

Answer all questions.
Each question carries 5 marks.

6. Explain reactance modulator using FET.

7. Explain the compatibility and characteristics of colour transmission.

8. Mention the advantages, limitations and applications of continuous wave radar system.

9. Explain the functions of Temetry and command power system.

10. Explain the function of M-Ary frequency shift keying.

$(5 \times 5 = 25$ marks$)$

Part C

Answer all questions.
Each question carries 12 marks.

11. With block schematic, explain the function of superheterodyne FM receiver.

Or

12. With block diagram, explain the function of superhetrodyne AM receiver.

Turn over

13. With block schematic, explain the function of SECAM and PAL transmitters.

Or

14. Explain NTSC system. What are various television standards ?

15. With block schematic explain the function of pulsed radar system.

Or

16. Explain continuous wave radar and MTI radar system. Mention their advantages, limitations and applications.

17. (a) Explain TDMA and FDMA technique. (8 marks)

    (b) Explain earth station with block schematics. (4 marks)

Or

18. Explain multiplexing method in SATCOM systems.

19. Explain the principles of binary amplitude shift keying and binary phase shift keying.

Or

20. What is PCM ? With a block diagram, explain the generation of PCM.

[5 × 12 = 60 marks]

G 5651

Reg. No...................................

Name...................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 706 L02—INDUSTRIAL INSTRUMENATION (Elective–II) [EE]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer **all** questions.*
Each question carries 3 marks.

1. What are bellows ? Explain bellow pressure gauges.

2. What are the errors that can occur in manometer ? What are their advantages and disadvantages ?

3. What are electrical pressure transducers ? Explain.

4. Write basic principle and working of Pirani gauge.

5. What are elastic type pressure transducers ?

(5 × 3 = 15 marks)

Part B

*Answer **all** questions.*
Each question carries 5 marks.

6. Describe the material for RTDs and its salient features.

7. Explain the principle of operation of LVDT.

8. Describe the principle of operation of Mc Leod gauge.

9. What are thermocouples ? Explain.

10. Give basic principle of piezo electric transducers.

(5 × 5 = 25 marks)

Part C

*Answer **all** questions.*
Each full question carries 12 marks.

11. (a) Explain different methods for the measurement of displacement. (6 marks)

    (b) Explain hydraulic force meter. (6 marks)

Or

Turn over

12. (a) Describe the principle of tachometers and explain any two types of tachometers. (6 marks)

(b) Describe force measurement methods. (6 marks)

13. (a) Explain magnetic method of density measurement. (6 marks)

(b) Explain vibrational method of density measurement. (6 marks)

Or

14. (a) Write short note about pH measurement. (6 marks)

(b) Describe any *two* viscosity measurement methods. (6 marks)

15. (a) Explain the following :—

(i) Microwave level switches.

(ii) Optical level detector.

(6 marks)

(b) Explain pressure gauge method of level measurement. (6 marks)

Or

16. (a) Explain displacer level detector with neat sketches. (6 marks)

(b) Explain radiation level detectors. (6 marks)

17. (a) Explain different methods for the measurement of vacuum. (6 marks)

(b) Write notes about calibration of pressure measuring instruments. (6 marks)

Or

18. What are the different types of electrical pressure transducers used in process industries ?

19. Briefly explain about pyrometers.

Or

20. Explain different methods for the measurement of temperature.

[5 × 12 = 60 marks]

G 5655

(Pages : 2)

Reg. No.............................

Name.............................

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 706 L06—SPECIAL ELECTRICAL MACHINES (ELECTIVE–II) (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Compare brushless DC motor with conventional DC motor (any *three* points).

2. State any *three* types of stepper motor.

3. Give any *three* points of comparison between variable reluctance stepper motor and switched reluctance motor.

4. State the working principle of permanent magnet synchronous motor.

5. Define stepper motor and its step angle.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Draw and explain dynamic characteristics stepper motor.

7. Write down the torque equation of switched reluctance motor.

8. Write note on axial and radial airgap motor.

9. Write note on multiphase brushless motor.

10. What is the difference between permanent magnet brushless DC motor and permanent magnet synchronous motor ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each question carries 12 marks.

11. Explain with constructional details the working of stepper motor.

Or

12. Give the comparison between variable reluctance stepper motor and permanent magnet stepper motor.

13. Explain the working of switched reluctance motor drawing its construction details.

Or

14. Write in detail the power controllers and characteristics of a switched reluctance motor.

15. Draw constructional diagram of synchronous reluctance motor and explain its operating principle.

Or

16. Derive the torque equation of a synchronous reluctance motor. Draw its torque speed characteristics.

17. Write on commutation in DC motors and give the difference between mechanical and electronic commutator.

Or

18. Drawing suitable diagram, explain the working of permanent magnet brushless d.c. motor. Give its advantages and applications.

19. Drawing constructional details explain the working of permanent magnet synchronous motor.

Or

20. Explain with block diagram the control strategies used in permanent magnet synchronous motor.

[5 × 12 = 60 marks]

G 5565   (Pages : 2)   Reg. No..............................

Name................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 701—ELECTRICAL POWER TRANSMISSION (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Write the effect of earth on capacitance.

2. How the transmission lines are classified ?

3. What is the sag when the transmission lines are at unequal heights ?

4. What do you mean by effective grounding ?

5. Give a simple model of STATCOM.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Find the flux linkages within the conductor producing the flux.

7. What is the power transfer capability of transmission lines ?

8. What are the major tests conducted on insulators ?

9. What are factors affecting corona loss ?

10. What do you mean by thyristor controlled reactor TCR ?

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each question carries 12 marks.

11. Find the loop inductance of a single-phase two wire line.

Or

Turn over

12. (a) Find the loop inductance and reactance per km. of a single-phase oil line consisting of two conductors each 1 m. diameter. The spacing between conductor is 1.25 m. and frequency 50 Hz.

(6 marks)

(b) A 3-phase transmission line 100 km. long has its conductors 0.5 cm. dia spaced at the corners of an equilateral triangle of 120 cm. side. Find the inductance/phase of the system.

(6 marks)

13. Find the generalized circuit constants of medium transmission line using nominal Pi method.

Or

14. A 3-phase, 50 Hz transmission line 100 km. long deliver 20 MW at 0.9 p.f. lag at 110 kV. The resistance and reactance of the line per phase per km. are 0.2 Ω and 0.4 Ω respectively, while capacitance admittance is 2.5×10^{-6} siemens/km/ph. Calculate (i) the current and voltage at the sending end ; (ii) efficiency of transmission. Use nominal T method.

15. (a) What are different types of insulators ?   (3 marks)

(b) Find the potential difference of a string insulator having 4 sheds.   (6 marks)

(c) What do you mean by string efficiency ?   (3 marks)

Or

16. What do you mean by capacitance grading ? Derive the equation for potential difference between core and sheath in capacitance grading.

(3 + 9 = 12 marks)

17. What are different earthing systems (grounding) in substations.

Or

18. A 3-phase, 220 kV, 50 Hz transmission line consists of 1.5 cm. radius conductor spaced 2 m. apart in equilateral triangle formation. If the temperature is 40° C. and atmospheric pressure is 76 cm., calculate the corona loss per km. of the line. Take $m_0 = 0.85$.

19. (a) Types of HVDC links—Explain.   (6 marks)

(b) What are the different interconnection methods of HVDC into AC systems.   (6 marks)

Or

20. Explain with neat sketches :

    (i) UPFC ; (ii) TCR ; (iii) TCSC.

[5 × 12 = 60 marks]

G 5580   (Pages : 2)   Reg. No............................

Name...........................

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 702—SYNCHRONOUS MACHINES (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Discuss the features of cylindrical type synchronous machine.

2. What do you mean by short circuit ratio ?

3. List out the application of synchroscope.

4. Discuss the importance of synchronous condenser.

5. What do you mean by voltage regulation ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Discuss about the full pitch winding and list out the advantages of short pitch winding.

7. Discuss about the slip test.

8. Explain in detail about the damper winding.

9. Discuss about V curve and inverted V curve.

10. Explain the principle of operation of brushless alternator.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. Calculate the rms value of the induced e.m.f. per phase of a 10-pole, 3 φ, 50 Hz alternator with 2 slot per pole per phase and 4 conductors per slot in two layers. The coil span is 150. The flux per pole has a fundamental component of 0.12 Wb and a 20 % third harmonic component.

Or

Turn over

12. Derive the expression for the distribution factor of alternator.

13. A 3-phase, star-connected, 1000 kVA, 1100 V alternator has rated current of 52.5A. The a.c. resistance of the winding per phase is 0.45 Ω. The test results are given below :

    OC Test : Field current = 12.5 A, voltage between lines = 422 V

    SC Test : Field current = 12.5 A, line current = 52.5 A.

    Determine the full-load voltage regulation of alternator (a) 0.8 p.f. lagging ; (b) 0.8 p.f. leading.

<center>*Or*</center>

14. Explain the Potier method of determination of voltage regulation of an alternator.

15. Discuss about the starting methods of synchronous motor and explain the term husting.

<center>*Or*</center>

16. A 3-phase, 415 V, 6-pole, 50 Hz star connected synchronous motor has e.m.f. of 520 V (L – L). The stator winding has a synchronous reactor of 2Ω per phase and the motor develops a torque of 220 N-m. The motor is operating at 415 V, 50 Hz bus (a) calculate the current drawn from the supply and its power factor ; (b) draw the phasor diagram showing all the relevant quantities.

17. Discuss in detail about the effect of varying the excitation of a synchronous machine connected to infinite bus bars.

<center>*Or*</center>

18. Explain the symmetrical short circuit of alternators during transient and sub transient periods with relevant waveforms.

19. Discuss about the different types of excitation systems and excitation limits.

<center>*Or*</center>

20. Explain about the principle of operation and constructional features of brushless alternator.

<div align="right">(5 × 12 = 60 marks)</div>

G 5595

(Pages : 3)

Reg. No..............................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 703—DRIVES AND CONTROL

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 marks.

1. Explain what do you understand by the steady state stability ? What is the main assumption ?

2. How regenerative braking is achieved in fully controlled rectifier fed d.c. drive ?

3. Why should the value of v/f ratio be maintained constant in an induction motor ?

4. Draw the circuit diagram of a current source inverter fed induction motor and list any *two* advantage of CSI.

5. List the advantages of load commutation over forced commutation.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 marks.

6. Describe the components of load torques.

7. Explain the operation of two-quadrant chopper circuit.

8. What is the necessity of v/f control for adjustable frequency drives ?

9. Explain, why has the static Kramer drive a low range of speed control ?

10. With a neat block diagram, explain the operation of an open loop control of a synchronous motor.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each question carries 12 marks.

11. State essential parts of electrical drives. What are the functions of a power modulator ?

Or

12. Explain in detail about the single-phase fully controlled rectifier control of d.c. separately excited motor (both continuous and discontinuous conduction).

13. Write short notes on the following :

    (i)   1-phase dual converter fed separately excited d.c. motor drive.

    (ii) List out the application and advantages of two quadrant operation of chopper fed drives.

                                                                  (8 + 4 = 12 marks)

Or

14. A d.c. motor is driven from a chopper with a source voltage 24 V d.c. and at a frequency of 1 kHz. Determine the variation in duty cycle required to have a speed variation of 0 to 1 p.u. elivering a constant 2 p.u. load. The motor details are as follows :

    1 hp, 10 V, 2500 r.p.m., 78.5 % efficiency, $R_a = 0.01$, $L_a = 0.0002$ H, $K_b = 0.03819$ V/rad/sec.

    The chopper is one quadrant, and the on-state drop voltage across the device is assumed to be 1V regardless of the current variation.

15. (i)   What is an energy efficient drive ? How can we achieve energy efficient operation in a stator voltage controller based 3-phase induction motor ?

    (ii) Explain why stator voltage is suitable for speed control of induction motors in fan and pump drives ?

                                                                  (6 + 6 = 12 marks)

Or

16. Discuss the operation of a v/f control based VSI fed 3-phase induction motor drive working on closed loop operation.

17. A 3-phase, 400 V, 50 Hz, 4-pole, 1400 r.p.m. Y- connected wound rotor induction motor has the following parameters referred to stator: $R_s = 2$ ohm, $R'_r = 3 \, \Omega$, $X_s = X'_r = 3.5 \, \Omega$. The stator to rotor turns ratio is 2. The motor speed is controlled by static scherbius Drive. The inverter is directly connected to the source. Determine :

    (i)   The speed range of the drive when $\alpha_{max} = 165°$.

    (ii) The firing angle for 0.4 times the rated motor torque and a speed of 1200 r.p.m.

    (iii) Torque for a speed of 1050 r.p.m. and firing angle of 95°.

Or

18. Explain how a voltage source inverter fed induction motor is operated in dynamic braking and regenerative breaking.

19. A synchronous motor is controlled by a load commutated inverter

Or

20. Brieflyexplain the important features of traction drives.

                                                                  (5 × 12 = 60 marks)

19. (a) Write a note on Direct Digital Control and Distributed Digital Control.   (4 marks)

    (b) What is meant by Supervisory Control ?   (4 marks)

    (c) Draw the Block diagram of PLC and test its application.   (4 marks)

Or

20. (a) Write a note on PLC Programming Language.   (3 marks)

    (b) Test the control hierarchies for plant level automation.   (4 marks)

    (c) Write down the rules for proper construction of ladder diagram.   (5 marks)

[5 × 12 = 60 marks]

G 5609   (Pages : 4)   Reg. No.................................

Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 704—MODERN CONTROL THEORY (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 marks.

1. How to determine the desired closed loop pole location in a given Control System ?

2. Define 'Singular Points' in a Control System. How it can be used for determining stability ?

3. Solve the difference equation using z- transform method.

$$x(k+2) + 5x(k+1) + 6x(k) = 0$$

$$x(0) = 0, x(1) = 1.$$

4. What is the relation between S-plane and Z-plane poles is case of a discrete system ?

5. What is a Digital controller ? Compare Digital controller with analog controller.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 marks.

6. Consider the System described by :

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}.$$

Find whether the system is controllable and observable ?

Turn over

7. Describe isoline method of plotting phase trajectories.

8. What is a Lyapunov function ? What are its properties ?

9. Determine the Inverse z-transform of :

$$F(z) = \frac{z - 0.4}{z^2 + z + 2}.$$

10. Enumerate the difference between Micro Controller based control and DSP based control.

$$(5 \times 5 = 25 \text{ marks})$$

Part C

*Answer **all** questions.*
Each question carries 12 marks.

11. (a) Name the classification of singular points and sketch them neatly.   (5 marks)

     (b) What is the Relationship between Controllability, observability and Transfer Function. Give the condition for complete observability in S-planer.

                                                   (5 marks)

     (c) What is Duality Property ? State it.   (2 marks)

Or

12. Design a state observer for the system the system is described by :

$$\left. \begin{array}{l} \dot{X} = AX \\ Y = CX \end{array} \right\} \text{where } A \begin{bmatrix} -1 & 1 \\ 1 & -2 \end{bmatrix}, C = \begin{bmatrix} 1 & 0 \end{bmatrix}$$

the desired Eigen values for the Observer matrix are $\mu_1 = -5$ are $\mu_2 = -5$.

13. (a) What is the difference between intentional non-linearities and inherent non-linearities ?

                                                   (4 marks)

     (b) What is meant by frequency entrainment in systems ?   (4 marks)

   (c) What is a phase plane portrait ? What is its use ?   (4 marks)

Or

14. Construct a phase plane trajectory by delta method for a non-linear system represented by the differential equation $\ddot{x} + 4 |\dot{x}| \dot{x} + 4x = 0$. Choose initial condition as $x(0) = 1.0$ $\dot{x}(0) = 0$.

15. (a) List any *five* common non-linearities and sketch them neatly.   (4 marks)

     (b) Obtain the describing function of a saturation non-linearity.   (8 marks)

Or

16. (a) Define jump Resonance phenomena in control System.   (2 marks)

     (b)

For the input-output characteristic shown, obtain the Describing Function

                                                   (10 marks)
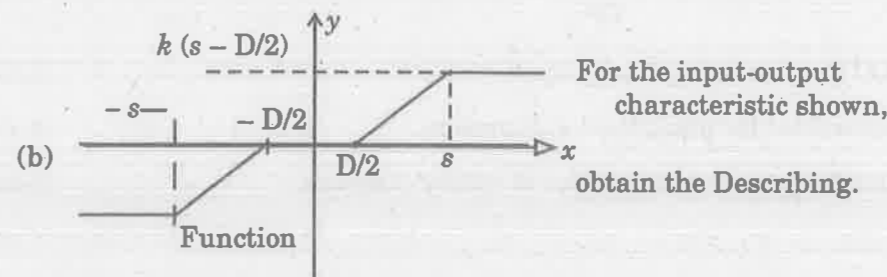
17. (a) Define z-transform of a function. What is meant by Region of Convergence ?   (4 marks)

     (b) Obtain the z-transform of :

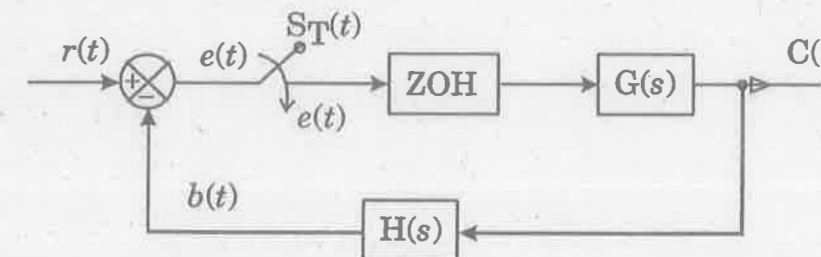   (i) $f(k) = \left(\frac{1}{2}\right)^k u(k)$.   (3 marks)

           (ii) Determine the z-transform and ROC of $f(k) = \{2, 4, \underset{\uparrow}{5}, 7, 3\}$.   (3 marks)

           (iii) Define Pulse Transfer Function.   (2 marks)

Or

18. (a) List the properties of convolution in discrete time system with a definition of convolution sum.   (2 marks)

     (b) Find $\dfrac{C(z)}{R(z)}$ for the closed loop sampled data control system. Assume all the samples to be of impulse type :

                                                   (10 marks)

Turn over