

**F 4649**

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch : Electrical and Electronics Engineering

EE 010 703—DRIVES AND CONTROL (EE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. Explain the classification of load torques.
2. Explain the principle of dual converter fed DC driver.
3. Explain the principle of V/f control.
4. Explain the basic principle of vector drive.
5. Mention the important features of traction drives.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Explain the principle of four quadrant operation of electric drives.
7. Explain the principle of chopper fed drives.
8. Explain constant power operation.
9. Explain the principle operation CSI fed induction drives.
10. Mention the important features of conventional AC traction drives.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain the dynamics of electric drive. What are the different methods of speed control DC motor drive ?

Or

12. With relevant sketches, explain the single-phase fully controlled bridge rectifier drive (separately excited).

Turn over

13. Explain 3-phase half coupled bridge rectifier drive for motoring and inverter modes of operation with relevant sketches.

Or

14. Explain chopper fed drives for single and two quadrant operation with diagrams.

15. Explain V/f control induction motor drive.

Or

16. Explain CSI fed induction motor drive and discuss the regenerative braking of CSI the drives.

17. Explain the static Kramer's drive and state schorhivs drive of induction motor.

Or

18. Explain with diagram, step power receiving scheme.

19. Explain the voltage source inverter drive with open loop control. Discuss the principle of self controlled synchronous motor drive.

Or

20. Explain the AC traction using PWM VSI SCIM drives.

(5 × 12 = 60 marks)

F 4701

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch : Electrical and Electronics Engineering

EE 010 706 L06—SPECIAL ELECTRICAL MACHINES (Elective II) [EE]

(New Scheme—2010 Admission onwards)

[Regular/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.
2. Explain commutation in DC motors.
3. Write difference between Mechanical and Electronics commutators.
4. Explain torque-speed characteristic of permanent magnet brushless DC motor.
5. Derive e.m.f. equation of synchronous motor.

(5 × 3 = 15 marks)

**Part B**

Answer all questions.

Each question carries 5 marks.

6. Explain the principle of operation of synchronous reluctance motor.
7. Derive the e.m.f. equation of a permanent magnet synchronous motor.
8. Explain briefly Hall and Optical sensors.
9. Explain torque-speed characters of PM synchronous motor.
10. Explain briefly motor characteristics.

(5 × 5 = 25 marks)

**Part C**

Answer all questions.

Each question carries 12 marks.

11. (a) Explain the constructional features of hybrid stepper motor with neat sketch. (6 marks)  
(b) With neat sketch, explain the operation of single-phase stepper motors. What are its application ? (6 marks)

Or

12. With a diagram, explain the principle of operation of single-phase stepping motors.

Turn over

13. With a neat sketch, explain constructional features and principle of operation of switched reluctance motors.

Or

14. Derive an expression for torque equation and explain switched reluctance motor characteristics.

15. Derive the torque equation of synchronous reluctance motor and explain its torque-speed characteristics.

Or

16. With neat sketches, explain the speed control of synchronous reluctance motor.

17. Derive torque equation of a permanent magnet brushless DC motors and also explain torque-speed characteristics.

Or

18. With a neat diagram, explain multiphase brushless motor and square wave permanent magnet brushless motor drives.

19. Explain with block diagram the control strategies used in PM synchronous motor.

Or

20. Explain how a rotating magnetic field is created in PM synchronous magnet motor. Derive the torque expression of a PMSM.

(5 × 12 = 60 marks)

F 4697

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Name.....

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch : Electrical and Electronics Engineering

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

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. Explain active and passive transducers.
2. Describe any one viscosity measurement.
3. What are air bellows ?
4. Explain briefly force balance pressure gauge.
5. Illustrate three methods of temperature measurement.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Explain thermistor for temperature measurement.
7. Explain industrial viscometer.
8. Write about air purge system of level indicator.
9. Mention elastic pressure transducers.
10. Describe fibre optic temperature measurement.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain the following measurement techniques :
  - (a) Strain gauge.
  - (b) LVDT.

Or

**Turn over**

12. Describe the following with diagrams :—

- (a) Inline torque sensor.
- (b) Eddy current tachometer.

13. Illustrate any *two* viscosity measurement methods.

*Or*

14. Explain in detail the construction and working of pH electrode with neat sketch.

15. Describe any three indirect methods of level measurements with necessary diagrams.

*Or*

16. Write short notes on :

- (a) Capacitance level indicator.
- (b) Microwave level switches.

17. Illustrate Bourdon gauge with neat diagram. Mention its features.

*Or*

18. Write short notes on :

- (a) Pirani gauge with diagram.
- (b) Ring balance gauge with diagram.

19. Explain various types of expansion thermometers.

*Or*

20. Describe about temperature measurement considerations and calibration of thermometers.

(5 × 12 = 60 marks)

F 4671

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch—Electrical and Electronics Engineering

EE 010 705—COMMUNICATION ENGINEERING (EE)

(New Scheme—2010 Admission Onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. Write the time domain expression for an AM signal and draw its spectrum.
2. An MTI radar operates at 5 GHz, with a pulse repetition frequency of 800 pps. Calculate the lowest two blind speeds of this radar.
3. What is meant Geostationary satellite ?
4. Define the two types of errors that occur in Delta modulation schemes.
5. Determine the baud and minimum bandwidth necessary to pass a 10 kbps binary signal using amplitude shift keying.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Briefly explain the working of a Mixer/Converter in a AM receiver, with a block diagram.
7. Explain the features of a composite video signal.
8. Describe the working of a satellite transponder with a block diagram.
9. Compare the ASK, FSK and PSK modulation schemes.
10. What are the different types of orbital parameters in satellite communication ?

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each full question carries 12 marks.*

11. (a) Explain the working of an AM Super-heterodyne receiver with block diagram. (8 marks)  
(b) Briefly explain the working of an AM detector circuit. (4 marks)

Or

Turn over

12. (a) Describe the importance of pre-emphasis and de-emphasis in FM system. (4 marks)  
(b) Explain the working of an Armstrong indirect FM transmitter with a block diagram. (8 marks)
13. (a) Explain the Vestigial side band modulation. (6 marks)  
(b) Describe the different Television standards. (6 marks)

Or

14. Explain what is meant by the Y, I and Q signals in colour TV. How the I, Q and Y signals are generated in colour TV transmitter. Show the typical relation for Y, I and Q signals in terms the basic colours ; R, B and G.
15. What is Radar range equation ? What is its importance ? What are the factors that influence maximum range ?

Or

16. With the relevant block diagrams, explain the working of pulsed radar and MTI radar.
17. (a) What are the frequency bands used to communicate between Satellites and earth station to satellite ? Why are these frequency bands preferred ? (6 marks)  
(b) Explain the terms : C/N ratio and G/T ratio in satellite communication. (6 marks)

Or

18. What are the three different multiple access schemes ? Explain with necessary diagrams.
19. (a) With a block diagram, explain the working of a simplex PCM transmission system. (6 marks)  
(b) What is meant by companding ? Define the two companding laws. (6 marks)

Or

20. With the block diagrams of 8-PSK modulator and receiver, describe the working of the system. [5 × 12 = 60 marks]



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**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch : Electrical and Electronics Engineering

EE 010 702—SYNCHRONOUS MACHINES (EE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

Answer all questions.

Each question carries 3 marks.

1. Write advantages of stationary armature and rotating field in an alternator.
2. Derive an EMF equation of an alternator.
3. Write a short note on EMF commutation.
4. Explain briefly V and inverted V curve.
5. Explain armature reaction in synchronous motor.

(5 × 3 = 15 marks)

**Part B**

Answer all questions.

Each question carries 5 marks.

6. A lap wound, 4 pole AC generator with 480 conductors in the armature supplies 72 A. The brushes are given an actual lead of  $12^\circ$  (Mechanical). Calculate the cross-magnetizing ampere-turns per pole.
7. Differentiate between the features of cylindrical and salient pole machines.
8. Explain the starting methods of a synchronous motor.
9. Explain briefly the principle of operation of brushless alternators.
10. Explain briefly hunting in synchronous machines.

(5 × 5 = 25 marks)

**Part C**

Answer all questions.

Each full question carries 12 marks.

11. (a) Derive emf equation of alternator and explain coil span and distribution factor. (6 marks)  
(b) Discuss the constructional details of a synchronous machine. Where salient pole rotors are preferred? (6 marks)

Or

Turn over

12. The following test results are obtained on a 6600 V alternator :

Open-circuit voltage :	3100	4900	6600	7500	8300
Field-current ampere :	16	25	37.5	50	70

A field current of 20 A is found necessary to circulate full-load current on short-circuit of the armature. Calculate by (i) The ampere-turn method and (ii) The synchronous impedance method. The full-load regulation at 0.8 p.f. (lag). Neglect resistance and leakage reactance.

13. What is armature reaction ? Explain the effect of armature reaction on the terminal voltage of an alternator at (i) unity power factor ; (ii) zero leading power factor load. Draw the relevant phasor diagram.

Or

14. (a) Define the terms synchronous reactance and voltage regulation of alterantor. Explain synchronous impedance method of determining regulation of alternator.

(6 marks)

(b) Describe the slip test method for the measurement of  $X_d$  and  $X_q$  of synchronous machines.

(6 marks)

15. Derive expressions for synchronising power and synchronising torque when two alternators are connected in parallel.

Or

16. (a) Explain the construction and principle of operation of a synchronus motor. (6 marks)

(b) A 2.3 kV, 3 $\phi$ , star connected synchronous motor has  $Z_s = (0.2 + j 2.2) \Omega$ /phase. The motor is operating at 0.5 p.f. leading with a line current of 200 A. Determine the generated e.m.f. per phase.

(6 marks)

17. Explain the symmetrical short circuit of alternator during transient and subtransient periods with relevant waveforms.

Or

18. (a) Explain briefly synchronous condenser. (6 marks)

(b) Explain the steady-state limit. How can it be improved for synchronous machines ?

(6 marks)

19. Explain the principle of operation and constructional features of brushless alternators.

Or

20. Explain the excitation schemes of brushless alternators.

[5 × 12 = 60 marks]

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**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch : Electrical and Electronics Engineering

EE 010 701—ELECTRICAL POWER TRANSMISSION (EE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

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

1. Explain the effect of earth on capacitance.
2. Explain Ferranti effect.
3. What are the factors that affect sag in an overhead line ?
4. Explain different types of substations.
5. Mention various application of HVDC.

(5 × 3 = 15 marks)

**Part B**

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

6. With a neat sketch explain skin effect and proximity effect.
7. Explain power transfer capability of transmission lines.
8. With a neat diagram, describe varley loop test for the location of faults in the underground cables.
9. Explain the main substation equipments.
10. Mention the advantages of HVDC transmission over HVAC transmission.

(5 × 5 = 25 marks)

**Part C**

*Answer any one full question from each module.  
Each full question carries 12 marks.*

11. With necessary diagram, derive inductance of three-phase transmission line ? Derive the inductance if the line is transposed.

Or

12. Derive the expression for the capacitance of 3-phase line with asymmetrical spacing.

Turn over

13. A three-phase, 100 km, transmission line is delivering 50 MW, 0.8 pf, lagging at 132 kV. Each conductor is having resistance 0.1 mho/km, reactance 0.3 mho/km, and admittance  $3 \times 10^{-6}$  mho/km. If the load is balanced and leakage is neglected. Calculate the sending end voltage, sending end power factor, efficiency and regulation of the line using nominal T representation.

Or

14. Derive the expression for receiving and sending end power flow through a transmission line.  
 15. Derive an expression for sag in an overhead line conduction supported by the towers situated at same level.

Or

16. (a) A string insulator has 4 units and each unit is having capacitance C. The pin to earth capacitance is C/10. Find the voltage across each unit of the string and the string efficiency. (6 marks)  
 (b) Explain the effect of ice and wind loading on transmission line? (6 marks)  
 17. (a) Discuss the radio interference effect on power transmission line. (6 marks)  
 (b) A 3-phase transmission line is having three conductors equilaterally spaced 6m apart. The diameter of each conductor is 2 cm. The air temperature is 27° C and pressure is 72 cm of Hg. If the surface factor is 0.82 and irregularity factor is 0.90, find the critical disruptive and visual critical disruptive voltages. (6 marks)

Or

18. (a) Mention the various substations bus schemes? With a neat sketch explain any two types of substation scheme. (6 marks)  
 (b) Explain various factors affecting the corona loss. (6 marks)  
 19. With a neat sketch explain the different types of HVDC links. Why the bipolar line more commonly used.  
 Or  
 20. Explain (a) Thyristor switched capacitor; (b) Thyristor controlled reactor; (c) Static synchronous compensator; (d) Static Var compensator.

(5 × 12 = 60 marks)

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Seventh Semester**

Branch—Electrical and Electronics Engineering

**ELECTRICAL DRIVES AND CONTROL (E)**

(Old Scheme—Prior to 2010 Admissions—Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions briefly.  
Each question carries 4 marks.*

1. Explain various methods of speed control available in DC motor.
2. Explain the concept of freewheeling with generation applied in a DC motors.
3. Draw and explain dual converter fed DC motor drive.
4. What are the advantages of chopper fed drives ?
5. Discuss the principle of V/f control for a 3 phase squirrel cage induction motor.
6. Explain the principle of slip power recovery scheme for a 3 phase slip ring induction motor.
7. List out the application of VSC employed in an induction motor drive.
8. What are the merits by applying a current source inverter to the induction motor ?
9. With a neat sketch explain the principle of vector control of 3 phase AC motor.
10. Compare the self controlled synchronous motor with electronic commutation and load commutated thyristor inverter.

(10 × 4 = 40 marks)

**Part B**

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

11. (a) Explain the power load and source circuits of DC motor. (6 marks)
- (b) With a neat sketch explain the principle of full controlled bridge for a DC motor. (6 marks)

*Or*

12. Explain concept of half controlled bridge employed in a DC motor and draw the speed torque characteristics for various firing angle.
13. With a neat sketch explain the operation of four quadrants chopper drives.

*Or*

**Turn over**

14. (a) Explain the concept of circulating current mode of operation in drives. (6 marks)  
(b) With a neat sketch explain the 3 phase fully controlled bridge rectifier drives. (6 marks)
15. With a neat sketch explain the static kramer's drive rule for a induction motor and mention its various applications.

*Or*

16. With necessary diagram explain the principle of static scherbius drive for an induction motor. List out the various advantages of static scherbius drive.
17. (a) Compare voltage source inverter and current source inverter drive. (6 marks)  
(b) Discuss the flux weakening scheme of control in voltage source inverter drive. (6 marks)

*Or*

18. (a) Explain the V/f method of VSI drive. (6 marks)  
(b) Explain a pulse width modulation inverter DC motor drive. (6 marks)
19. With necessary diagram explain self controlled synchronous motor with electronic commutation.

*Or*

20. With a neat diagram explain operation of a voltage source inverter drive for a synchronous motor with open loop control.

[5 × 12 = 60 marks]