F 9111 (Pages : 2) Reg. No. EEE

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—III (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Describe the constructional differences between slip ring and squirrel cage induction machine.
2. What is meant by cogging ? What are its remedial measures ?
3. Explain how the starting torque varies with rotor resistance.
4. List the various applications of induction machines.
5. Describe the principle of operation of a synchronous induction motor.
6. Why single-phase induction motor is not self starting ? What are the various starting methods ?
7. Mention the need for compensation and interpole winding.
8. What is a hysteresis motor ? Explain briefly.
9. Explain the characteristics of three-phase series type commutator motor.
10. Describe how a commutator machine can be used as a frequency converter.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Derive the expression for the mechanical power developed in a 3-phase induction motor.

(6 marks)

(b) Draw the torque-slip curve and show the variation of torque-slip characteristics with rotor resistance.

(6 marks)

Or

12. (a) Estimate the equivalent circuit parameters from the no-load and blocked rotor test readings.

(4 marks)

Turn over

(b) A 4 pole, 50 Hz, 415 V, 37 kW delta connected 3-phase induction motor gave the following test readings :

No-load test : 415 V, 16A, 1.75 kW
Blocked rotor test : 100 V, 55 A, 1.85 kW

Stator resistance per phase is 0.45 Ω. Draw the circle diagram and predict the full-load performance.

(8 marks)

13. A 22 kW, 415 V, 4 pole, 50 Hz delta connected squirrel cage, 3-phase induction motor takes 39A on full-load and operates with a slip of 4 %. The total impedance per phase is 3.5 Ω. Find approximately the starting current drawn from the supply and the starting torque developed if the motor is started by a (i) DOL starter ; (ii) autotransformer starter with 60 % tapping ; and (iii) star-delta starter.

(12 marks)

Or

14. Briefly describe the various methods of speed control adopted for 3-phase induction motors.

(12 marks)

15. (a) Explain the principle of operation of an induction generator. (7 marks)

(b) Describe the rotor winding connections in a synchronous induction motor. (5 marks)

Or

16. (a) Obtain the equivalent circuit of a single-phase induction motor based on double field revolving theory.

(5 marks)

(b) A 4 pole, 50 Hz, single-phase induction motor has the power absorbed by forward and backward field rotor resistance are 200 W and 21 W respectively at a motor speed of 1440 r.p.m. The mechanical losses totals 20 W. Compute the shaft torque at that speed.

(7 marks)

17. Describe the theory of operation of a single-phase series motor. Obtain the circle diagram and predict the performance.

(12 marks)

Or

18. Explain the production of torque in repulsion motors. What are the various types ? Mention their applications.

(12 marks)

19. Show how the performance of an induction motor can be improved by double cage construction. Draw its equivalent circuit and torque-slip characteristics. (12 marks)

Or

20. Write short notes on :

(i) Schrage motor.

(ii) Linear induction motor.

(2 × 6 = 12 marks)

[5 × 12 = 60 marks]

F 9120 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL DRIVES AND CONTROL (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What do you understand by matching speed torque characteristics of load and motor ?
2. What are the factors governing the selection of electric drives for a particular application ?
3. Explain how speed torque characteristics of a d.c. shunt motor can be modified by introduction of armature series resistance.
4. How is the speed control of d.c. drive achieved using 3-phase fully controlled bridge rectifier ?
5. What are the methods of speed control for a 3-phase induction motor ?
6. Discuss static scherbius drive and its applications.
7. Discuss the main difference between Voltage source and Current source inverters.
8. Explain a sinusoidal PWM inverter and its significance.
9. Explain the adjustable frequency operation of synchronous motors.
10. List the various speed control schemes of synchronous motors.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. With neat waveforms, explain the operation of a single-phase half controlled bridge rectifier d.c. drive. Derive the performance parameters.

Or

12. Discuss the speed control of DC motor with single-phase fully controlled bridge rectifier. Draw the speed torque characteristics for various firing angles.

13. (a) A highly inductive d.c. load requires 12A at 150 V from a 230 V, single-phase a.c. supply in a fully controlled bridge converter. Determine E_m when $\alpha = 30°$.

    (b) List the advantages offered by d.c. chopper drives over converter controlled d.c. drives.

Or

14. Explain with neat circuit diagram and waveforms a dual converter fed DC motor drive.

Turn over

15. Explain the stator voltage control of 3-phase induction motor. What are the various controller configurations. Mention its applications.

Or

16. Discuss in detail slip power recovery scheme of induction motor. What are its advantages and disadvantages ?

17. Discuss the speed control of induction motor using voltage source inverters. List the different methods of voltage control adopted in inverter.

Or

18. (a) Explain a current source inverter and its application to induction motor drives.

    (b) Discuss the variable frequency operation.

19. Discuss with neat diagrams the synchronous and self control modes of a synchronous motor drive.

Or

20. (a) Explain the principle of vector control.

    (b) Open loop control of synchronous motor with voltage source inverter.

(5 × 12 = 60 marks)

F 9128 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch : Electrical and Electronics Engineering

UTILIZATION OF ELECTRICAL POWER (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Discuss the classification of load torques for various drives.
2. Explain countercurrent braking with the help of quadrant diagram.
3. Discuss the necessary features of Traction motors.
4. Discuss the main features of various Train services. What type of services correspond to Trapezoidal and quadrilateral speed time curves ?
5. What are the factors that limit choice of frequency in induction and dielectric heating ?
6. Compare various types of resistance welding processes.
7. What are polar curves ? Explain the importance of Rousseau's diagram.
8. What are the different types of Refrigeration systems ?
9. Explain the necessity of energy management.
10. What are the important non-conventional methods of generating electrical energy ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Explain the characteristic features of motors for applications in Textile mills and coal mines.

Or

12. Explain Regenerative braking. What is the energy returned to the mains during regeneration.
13. Obtain the expression for Tractive effort for propulsion of train.

Or

Turn over

14. An electric train has uniform acceleration from rest at 2 kmphps for 30 seconds, coasting for 50 seconds and braking period of 20 seconds. The train is moving a uniform down gradient of 1%, tractive resistance 40 N /tonne, rotational inertia effort 10% of dead weight, duration of stops 15 seconds and overall efficiency of transmission gear and motor of 75%. Calculate the schedule speed and specific energy consumption of run.

15. Describe with neat sketches, the construction, working, uses and limitations of different types of Arc furnaces.

Or

16. Explain and compare different types of Electric Arc welding.

17. Write a brief note on exterior lighting system design. Discuss the factors to be considered while designing street lighting.

Or

18. Differentiate between comfort Air-conditioning and Industrial Air-conditioning. What is meant by effective temperature in comfort Air-conditioning ?

19. Discuss the energy management techniques applied to residential buildings.

Or

20. Write short notes on the following :

    (a) Energy saving.

    (b) Solar power.

    (c) Luminous Efficacy and coefficient of utilisation.

(5 × 12 = 60 marks)

F 9138 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch—Electrical and Electronics Engineering

CONTROL SYSTEMS—II (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What are the characteristics of Cascade compensation ?
2. When do we use (i) time domain method ; (ii) frequency domain method for compensation ?
3. Write a note on sample and hold circuits.
4. State and explain Jury's stability criterion.
5. What are the characteristics of non-linear systems ?
6. Compare phase plane method and describing function method of analysis non-linear systems.
7. Define the state model of a system.
8. What are the properties of state transition matrix ?
9. Derive the relationship between transfer function and state space model.
10. Define controllability and observability of systems.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Design a phase lead compensator for a Unity feedback system with $G(s) = 20/[s(1 + 0.2s)^2]$ to have a phase margin of 45°.

Or

12. Explain with an example the steps involved in the design of a compensator using root-locus method.
13. Solve the difference equation :

$c(k + 2) + 3c(k + 1) + 2c(k) = u(k)$; Given $c(0) = 1$ and $c(k) = 0$ for $k < 0$.

Or

Turn over

14. Explain with an example the method of stability analysis using Jury's test.

15. Draw the phase plane portrait of the system defined by :

$$\dot{x}_1 = x_1 + x_2$$
$$\dot{x}_2 = 2x_1 + x_2$$

Or

16. Explain with an example the stability analysis of non-linear systems using describing function method.

17. Obtain a state model of the system described by :

$$\frac{C(s)}{R(s)} = \frac{s+10}{\left(s^3+6s^2+11s+6\right)}.$$

Or

18. Obtain the time response of the system described by :

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u.$$

with $x_1(0) = 0$ and $x_2(0) = 1$.

19. A discrete time system has the transfer function $T(z) = \frac{4z^3 - 12z^2 + 13z - 7}{(z-1)^2 (z-2)}$. Determine a state model of the system.

Or

20. Explain with an example the pole-placement method of compensation.

(5 × 12 = 60 marks)

F 9149 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch : Electrical and Electronics Engineering

SYSTEM DESIGN WITH MICROCONTROLLERS (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Give a brief comparison of Microprocessor and Microcontroller.
2. Describe the internal memory organisation of 8051.
3. Give *four* examples of single bit instructions in 8051.
4. How a time delay can be generated using timers in 8051 ?
5. What are the various interrupts in 8051 ?
6. What are the various modes of serial communication ?
7. Draw and explain the interfacing of an LCD display with 8051.
8. Show how a DAC can be interfaced with 8051 microcontroller.
9. Explain briefly what is meant by Data Acquisition System.
10. What are PLCs ? Explain their basic configuration.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. With a neat block diagram, explain the architecture of 8051 microcontroller bringing out its salient features.

Or

12. What are the various SFRs in 8051 ? What are their special functions ? Explain the function of each SFR.
13. What are the variuos addressing modes of 8051 ? Explain with examples.

Or

14. (a) What are the different jump and call instructions in 8051 ? (6 marks)

    (b) Write a programme to find the sum of 5 BCD numbers stored in RAM locations starting at 40 H. The result must be in BCD.

(6 marks)

Turn over

15. Write a program using interrupts to do the following :—

    (a) Receive data serially and sent it to PO.

    (b) Have PI port read and transmitted serially, and a copy given to P2.

    (c) Make timer 0 generate a squarewave of 5 kHz frequency on P 0.1. As sume that XTAL = 11.0592. Set the band rate at 4800.

Or

16. Explain briefly on different character transmission and reception techniques.

17. Show how a single 256 K × 8 RAM chip can be connected to an 8051 microcontroller. Draw a neat diagram. Explain how various blocks of this single chip are accuessed.

Or

18. Describe with neat diagram the interfacing of a matrix keyboard with 8051. Draw the flow chart for scanning and indentifying whether any key is pressed.

19. With a neat block diagram, explain how 8051 can be used for measurement of frequency. Give the algorithm of the software required.

Or

20. With necesary data acquisition systems explain with block diagram the application of 8051 in temperature control system. Write the necessary programme for temperature control.

(5 × 12 = 60 marks)

F 9190 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch—Electrical and Electronics Engineering

ELECTRICAL DRAWING (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **two** *questions from Part A and* **two** *questions from Part B.*
All questions carry equal marks.
Assume any missing data suitably.

Part A

1. Draw the developed winding diagram for a 4 pole, 12 slot simplex lap connected d.c. generator with commutator having 12 segments. Indicate the position of brush.

(25 marks)

2. Draw to a suitable scale half-sectional end view and half-sectional longitudinal view of 60 H.P., 4 pole D.C. shunt motor for the dimensions given below :

Armature

Outside diameter	= 18.5 cm
Length	= 13.5 cm
Number of slots	= 24
Size of slot	= 0.7 cm × 02 cm

Main pole (laminated)

Total height	= 11 cm
Width	= 7 cm
Pole arc	= 10 cm
Length of pole	= 14 cm
Air gap	= 0.5 cm

Inter pole (solid)

Size	= 2 × 10.8 cm
Length	= 11 cm
Commutator diameter	= 13 cm

Commutator length	= 10 cm
Total no. of spindles in Brush	= 4
Main pole winding thickness	= 2 cm
Inter pole winding thickness	= 1 cm

The armature is directly mounted on the shaft and is held between two end plates. The shaft is supported by means of end shield bearings in the end cover.

(25 marks)

3. Draw the sectional Elevation (with winding) and sectional plan of a single phase 500 kVA, 6600/440V power transformer (core type) with following dimensions :—

Core : Laminated steel plates of 0.35 mm thickness, core construction cruciform

Diameter	= 33 cm
Width of largest stamping	= 28 cm
Width of smallest	= 17.5 cm
Height of core	= 43 cm
Center to center distance between cores	= 49 cm
Core laminations are fixed by means of two end plates 3 mm thick by a bolt of diameter	= 1.2 cm
Yoke height	= 25 cm
Yoke length	= 77 cm
Total height of transformer	= 99 cm
LV winding total turns	= 22
No. of turns per limb	= 11
Height of one turn	= 28.5 mm
Radial thickness of one turn	= 23 mm
Total height of the core occupied by LV winding	= 36.2 cm
Inside diameter of LV winding	= 33.75 cm
Outside diameter of LV winding	= 38.35 cm
HT Winding total no. of turns	= 378
No. of turns per limb	= 189
Inside diameter of H.T. 1st layer	= 41.5 cm
Outside diameter of H.T. 1st layer	= 43.3 cm
Inside diameter of H.T. 2nd layer	= 45 cm
Outside diameter of H.T. 2nd layer	= 46.8 cm

(25 marks)

[2 × 25 = 50 marks]

Part B

4. Draw a mush winding diagram for a 4 pole, 36 slots, 3 phase armature.

(25 marks)

5. Draw the half-sectional front elevation and half-sectional end view of a 7.5 HP, 400 V, 50 Hz, 3 phase, 1440 r.p.m. slip-ring Induction motor with the following dimensions in mm.

Outside diameter of stator stamping	= 288
Inside diameter of stator stamping	= 216
Stator core length	= 106
Thickness of stator frame	= 31

Slots - 36 no :

(a) type : open type ;

(b) Size = 18 × 2

Air gap	= 2
Outside diameter of rotor stampings	= 212
Inside diameter of rotor stampings	= 36
Rotor core length	= 106
No. of slots (open type)	= 36
Slot size	= 12 × 8
Shaft diameter at centre	= 36
Shaft diameter at bearing	= 32

The stator frame has 8 and rotor stamping have 4 equally spaced duet for ventilation.

(25 marks)

6. Draw the half-sectional front elevation and end view of a 7.5 kVA, 400 V, 1500 r.p.m., 3 phase alternator with following dimensions in mm :

Outside diameter of stamping of field system	= 280
Inside diameter of stamping of field system	= 200
Thickness of frame	= 30
Core length of field system	= 170
Field system slot type	= Open type
Field system slot number	= 24
Field system slot size	= 25 × 8
Shaft diameter at centre	= 40
Shaft diameter at bearing	= 35

(25 marks)

[2 × 25 = 50 marks]

F 9173 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch : Electrical and Electronics Engineering

OBJECT-ORIENTED PROGRAMMING (Elective I) [E]

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. How are data and functions organized in an object-oriented program ?
2. What are the uses of private and public members ?
3. How are strings manipulated in C++ ? Support your answer with examples.
4. How is dynamic initialization of objects achieved ?
5. What does polymorphism mean in C++ ?
6. What are the uses of friend functions ?
7. How does inheritance influence the working of constructors and destructors ?
8. What is a stream ? Name the streams generally used for file I/O.
9. Explain the new and delete operators.
10. What is dynamic binding ? How is it implemented ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Compare procedure oriented and object-oriented programming techniques.

Or

12. Write a C++ program to illustrate the applications of inline functions.
13. Explain with an example the use of objects as function arguments.

Or

14. Illustrate how matrix variables can be constructed using class type objects.

Turn over

15. Write a C++ program to illustrate function overloading.

Or

16. Write a program to show how the Unary minus operator can be overloaded.

17. Write a program to illustrate the implementation of the concept of virtual base class.

Or

18. Discuss on the stream classes for file operations in C++.

19. What are the characteristics and uses of virtual functions ?

Or

20. Illustrate how run time polymorphism is achieved in C++.

(5 × 12 = 60 marks)

F 9174 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Seventh Semester

Branch : Electrical and Electronics Engineering

BIOMEDICAL INSTRUMENTATION (Elective I) [E]

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What is meant by depolarization ? Explain.
2. Explain the electro conduction of heart.
3. What is GSR ? Explain with uses.
4. Explain how the systemic body temperature is measured using a thermocouple.
5. Distinguish between Ventilators and Respirators.
6. Define the important lung volume capacities and explain.
7. What are spinal reflexes ? Explain.
8. What are the different parts of brain ?
9. Explain the basic principle of magnetic resonance imaging system.
10. List the basic NMR components and explain any *one* in detail.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Explain with diagram the cardiovascular system. (8 marks)

    (b) Explain how the bioelectric potentials are generated. (4 marks)

Or

12. Draw the block diagram of an ECG machine and explain how ECG is recorded.
13. Explain any *three* methods of direct pressure measurement.

Or

14. Explain the working principle of a pacemaker with its necessity. Also explain the different types of pacemakers with diagrams.

Turn over

15. (a) Explain how the blood pCO_2 is measured. (8 marks)

(b) Write notes on inhalators. (4 marks)

Or

16. Explain any *two* methods used to measure respiration rate. Compare them.

17. (a) Describe the anatomy of nervous system with figure. (8 marks)

(b) Briefly explain neuronal communication. (4 marks)

Or

18. Explain with diagram the 10-20 electrode placement system of EEG measurement.

19. Explain with block diagram the X-ray machine. What are its uses ?

Or

20. (a) Explain the basic principle of computed Tomography. (4 marks)

(b) What is diathermy ? Explain with diagram the surgical diathermy machine. (8 marks)

[5 × 12 = 60 marks]