F 3618 (Pages : 2) Reg. No.....E.E.E.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

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. Discuss the different types of 3-phase induction motors and their applications.
2. What is meant by cogging and crawling in 3-phase induction motors ?
3. What are the various methods of starting of a 3-phase cage induction motor ?
4. What is meant by single phasing of 3-phase induction motors ? Explain.
5. Explain the principle of operation of an induction generator.
6. Draw and explain the equivalent circuit of a single phase induction motor.
7. What is a Universal motor ? Discuss its applications.
8. Draw the phasor diagram of a single phase series motor.
9. Explain the characteristics of a double cage induction motor.
10. Discuss the use of commutator machines as frequency converters.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Derive the expression for torque developed and mechanical power in a 3-phase induction motor. Obtain the condition for pull out torque.

Or

12. A 3-phase 500 V, 50 Hz induction motor with 6 poles gives an output of 20 kW at 950 r.p.m. with a p.f. of 0.8. The mechanical losses are equal to 1 kW. Calculate for this load (i) slip ; (ii) rotor copperloss ; (iii) input of the stator losses are 1500 W ; (iv) line current.

Turn over

13. (i) The rotor of a 6-pole, 50 Hz, 3-phase induction motor has a resistance of 0.2 Ω per phase and runs at 960 r.p.m. If the load torque remains unchanged, calculate the additional rotor resistance that will reduce the speed by 10 percent.

(ii) Compare the starting torque and starting current in autotransformer and star-delta starting of 3-phase induction motor.

Or

14. Discuss in detail the various speed control techniques in 3-phase induction motors.

15. Explain the principle of operation and construction of synchronous induction motor. What are its applications ?

Or

16. (i) Explain the revolving field theory of single phase induction motor.

(ii) What are the various types of single phase induction motors ?

17. (i) Why are compensating winding and interpole winding used in a Universal motor for a.c. operation ?

(ii) Describe the working and uses of a Reluctance motor.

Or

18. Describe the construction and working of repulsion motor. What are its merits and demerits compared to series motors?

19. In a double cage induction motor, if the outer cage has an impedance of $(2 + j\,1.2)$ ohm at standstill, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of $(0.5 + j\,3.5)$ ohm at standstill.

Or

20. (i) What are the applications of a Schrage motor ?

(ii) Explain the principle of operation of a Linear Induction motor.

(5 × 12 = 60 marks)

F 3627 (Pages : 2) Reg. No.....

Name .....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

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 are the factors governing the selection of electric drives for any particular application ?
2. Explain the various methods of speed control for DC shunt motors.
3. What is a four quadrant DC drive ? Explain.
4. List the advantages offered by DC chopper drives over line commutated converter controlled DC drives.
5. Explain the stator voltage control of 3-phase induction motor.
6. Discuss the principle of slip power recovery scheme of induction motors.
7. Compare voltage source inverters with current source inverters.
8. What is a PWM inverter ? List its advantages.
9. What are the methods of speed control of synchronous motors ?
10. Explain the principle of vector control.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (i) Discuss in detail about the general analysis and the evaluation of performance parameters in DC drives.

    (ii) Explain the operation of a single-phase full-wave rectifiers with d.c. separately excited motor.

Or

12. The speed of a 220 V, 3.73 kW, 1000 r.p.m. DC shunt motor is controlled by a single-phase full converter. The a.c. supply is 240 V, 50 Hz. A large inductance is connected in series with the armature. Assume the motor and converter to be loss less. The motor e.m.f. constant is 1.9 V-s/rad. For a speed of 1000 r.p.m. and rated motor current determine (i) the firing angle of the converter ; (ii) r.m.s. value of supply current and power factor.

13. With necessary circuit diagrams and waveforms explain the operation of a 3-phase fully controlled bridge rectifier controlled DC drives. Explain the free wheeling with regeneration.

Or

Turn over

14. (i) Explain the operation of a four quadrant chopper controlled DC drive.

(ii) Discuss the significance and applications of DC drives.

15. Discuss the various controller configurations for the stator voltage control of inductor motors. Explain their operator and applications.

Or

16. Briefly explain the *v/f* control of induction motors. Discuss the constant torque and constant power control.

17. With necessary circuit diagram explain the flux weakening scheme of control of induction motor.

Or

18. With necessary circuit diagrams explain the principle of current source inverter fed induction motor drives. Explain fixed frequency and variable frequency operation.

19. (i) Explain the principle of synchronous motor control.

(ii) Explain the adjustable frequency operation of synchronous motors.

Or

20. With neat circuit diagram and relevant waveforms. Explain the operation of a self controlled synchronous motor with electronic commutation.

(5 × 12 = 60 marks)

F 3635 (Pages : 2) Reg. No.....

Name .....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Seventh Semester

Branch : Electrical and Electronics Engineering

UTILIZATION OF ELECTRICAL POWER (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the speed torque characteristics of active and passive loads and justify the location in the four quadrant system.
2. What is regenerative braking ? Explain the operation of DC shunt motor when subjected to regenerative braking.
3. List out the advantages of various systems of traction.
4. Sketch the typical speed-time curves for :
   (i) Main line service usng electric locomotives.
   (ii) Suburban service with electric traction.
5. Discuss any *four* applications of dielectric heating.
6. Distinguish between the direct and indirect type of arc furnace.
7. A building measuring 30 m. × 20 m. is to be flood lit on a front side with brightness of 25 lumen/sq.metre. Coefficient of reflection of building surface is 0.25. Lamps of 500 W having lumens output of 8000 each are used. Assuming beam factor as 0.6 waste light factor 1.2 and maintenance factor as 0.75, determine the number of lamps required.
8. Discuss about the types of refrigeration.
9. What is solar power ? Discuss briefly various possible large scale applications of solar power.
10. Explain the term "Energy auditing".

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Explain in detail about the various factors which affect the selection of motor for a particular drive.

(12 marks)

Or

12. A 400 V, 4 pole, 50 Hz. induction motor develops 25 h.p. at 4 % slip on full load. If the ratio of rotor resistance to standstill reactance is 1:4, estmate in kg-m. the initial plugging torque and the torque at standstill.

(12 marks)

Turn over

13. Derive the expression for :

(i) The tractive effort for propulsion of a train on level track.

(ii) Tractive effort for propulsion of a train up and down a gradient.

(12 marks)

Or

14. Discuss the bridge transition and shunt transition methods used during starting of traction motors and state their applications.

(12 marks)

15. Explain in detail about the different types of high frequency heating. Also mention the merits and demerits of each type.

(12 marks)

Or

16. Explain and compare different types of arc welding.

(12 marks)

17. Explain the various factors to be taken into account for designing schemes for :

(i) Street lighting.

(ii) Factory lighting.

(iii) Flood lighting.

(4 + 4 + 4 = 12 marks)

Or

18. Explain about the different types of Air-conditioning. (12 marks)

19. Briefly discuss various non-conventional methods of generating electrical energy. (12 marks)

Or

20. Write short notes on :

(i) Energy management. (4 marks)

(ii) Tidal power. (4 marks)

(iii) Geothermal power. (4 marks)

[5 × 12 = 60 marks]

F 3645 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Seventh Semester

Branch : Electrical and Electronics Engineering

CONTROL SYSTEM II (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What is meant by cascade compensation?
2. Derive the pole-zero plot of a lag-leed compensator?
3. State and explain sampling theorem.
4. Define pulse transfer function.
5. Enumerate the common non-linearities found in systems.
6. What is the basic concept behind the phase plane method?
7. What are the advantages of state space representation?
8. What are the properties of state transition matrix?
9. What is the basic principle of pole placement compensation?
10. Discuss the conditions for observability of a system.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. The Openloop transfer function of a unity feedback system is $G(s) = k/S^2$. Design a cascade compensator so that $t_s \leq 4S$ and $Mp \leq 20\%$ for a step input.

Or

12. The openloop transfer function of a unity feedback system is $G(s) = K/[S(s + 1)(s + 2)]$. Design a compensator so that the compensated system has Kv=10/S; phasemargin is 50° and the gain margin is at least 10dB.

Turn over

13. Solve the difference equation. $x\,(n+2) - 3x\,(n+1) + 2x\,(n) = 4^K$, given the initial conditions : $x\,(0) = 0$; $x\,(1) = 1$

Or

14. Explain with an example Jury's test as applied to digital control system.

15. Obtain the phase trajectory for the system represented by $\ddot{x} + \dot{x} + x = 0$.

Or

16. Derive the describing function of a deed zone non-linearity.

17. Obtain a state model for the system described by $\dddot{y} + 6\ddot{y} + 11\dot{y} + 6y = \dot{x} + 5x$.

Or

18. Obtain the time response of the system $\dot{x} = AX + BU$ where $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$; $B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and $U(t)$ is a unit step input. Given $x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$.

19. Obtain the transfer function of the system whose state model is

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

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

Or

20. The state model of a system is given by

$$\dot{X} = \begin{bmatrix} 0 & 11 \\ -12 & -7 \end{bmatrix} X = \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

$$Y = \begin{bmatrix} -10 & -4 \end{bmatrix} X + u(t)$$

Test for state controllability, output controllability and state observability.

(5 × 12 = 60 marks)

F 3698 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

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 of a 15 slots 4 pole double layer wave winding.
2. Draw half sectional elevation of a 50 HP, 4 pole D.C. motor for the following dimensions :—

Main pole :

Laminated total height	=	11 cm.
Width	=	7 cm.
Pole arc	=	10 cm.
Length of the pole	=	14 cm.
Air gap length	=	0.5 cm.

Inter pole :

Solid size	=	2 × 10.8 cm.
Length	=	11 cm.

Armature :

Outside diameter	=	18.5 cm.
Length	=	13.5 cm.
No. of slots	=	24
Size of slot	=	0.7 × 2 cm.

Commutator :

Diameter	=	13 cm.
Length	=	10 cm.

Brush :

Total no. of spindles	=	4
Main shunt field winding	=	2 cm. thick
Inter pole winding	=	1 cm. thick

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

Turn over

3. Draw the sectional elevation of a single-phase shell type transformer for the dimensions given below :—

Core width	=	14 cm.
Core depth	=	37 cm.
Core height	=	38 cm.
Core length	=	54 cm.
Window size	=	13 × 24 cm.
LV coil	=	4
HT coil	=	4
No. of turns in LV per coil	=	10
No. of turns in HT per coil	=	40
Cross-section of HT conductor	=	28 sq.mm.
Cross-section of LT conductor	=	125 sq.mm.
Average height of one turn	=	1.8 cm.

Coil to be arranged for medium reactance.

(2 × 25 = 50 marks)

Part B

4. Draw the developed winding diagram of a 24 slot, 4 pole, 3-phase double layer lap winding short chorded by one slot.

5. Draw the half-sectional elevation of a 3-phase slip-ring induction motor with the following specifications :—

Inside diameter of stator	=	55 cm.
Stator length	=	20 cm.
Stator over hang on each side	=	10 cm.
Length of the stator frame	=	38 cm.
Diameter of rotor	=	54.6 cm.
Total length of the motor at footstep	=	73 cm.
Height of base upto the eye bolt	=	93 cm.
Width at footstep	=	92 cm.
Foot thickness	=	5 cm.
Length	=	14 cm.

6. Draw a half-sectional elevation of a 500 kVA salient pole alternator of the following details stator laminated, as 24 cm. length and has 5 radial ducts. The stator laminations are held by means of two end plates bolted together :—

Inside diameter of stator	=	108.4 cm.
Outside diameter of stator	=	140.4 cm.
Overhang of the stator coil on each side	=	16 cm.

Rotor, salient pole, made from the laminations and fixed with the spider by means of bolts in wardly diameter of rotor = 107.2 cm.

Other missing data, if any, may be assumed.

(2 × 25 = 50 marks)

F 3656 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

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. Where are GFO and GFI flags stored in 8051. Describe its configuration.
2. Write a note on the bit address able area of 8051.
3. Enumerate the difference between MOVX and MOVC instructions.
4. Name the only flag that gets affected during Rotate instruction in 8051. Give its significance.
5. Differentiate between ACALL and LCALL instruction of 8051.
6. Explain the methods of introducing time delays in 8051.
7. Differentiate between multiple keys and rapid key hit of a keyboard.
8. How does 8051 handle multiple interrupts for small systems ?
9. Describe the specifications of ROM and RAM for which 8051 may be used independently.
10. How do you check to ensure that microcontroller can fetch and execute programs from EPROM.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Describe the different modes of operation of timers in 8051.

Or

12. Interrupt handling play an important role in real time programming. How is this incorporated in 8051 ?
13. Write a note on bit level logical operations in 8051.

Or

14. The number A6h is placed somewhere in external RAM between locations 0100h and 0200h. Find the address of that location and put the address in R6 (LSB) and R7 (MSB).

Turn over

15. Explain how lookup table technique is made efficient in 8051.

Or

16. Write a program to take a character in A register, transmit it, accommodate delay for the transmission time and then return to the calling program. Assume Timer 1 is to be set at baud rate of 2400 band and delay for one 10-bit character is 5 ms.

17. Write short notes on different types of display devices that you are familiar with.

Or

18. Write a program that can digitize an input voltage and store the value in external RAM location 4000 h to 43 E7h. The inputs have to be sampled in every 100 μs.

19. With a neat block diagram, explain how a stand along microcontroller can be designed.

Or

20. Explain the configuration of PLC with a diagram.

(5 × 12 = 60 marks)

F 3681 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Seventh Semester

Branch—Electrical and Electronics Engineering

OBJECT ORIENTED PROGRAMMING (Elective I) (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define classes and objects.
2. Write simple example for polymorphism.
3. What are structural and procedural languages ?
4. Explain the objects used as function.
5. Define the copy constructor with example.
6. Differentiate "exit ( )", and "exit (1)".
7. Can the assignment operator "=" can be overloaded using a friend function ?
8. What is a protected visibility specifier to a class member ?
9. Define compile-time Polymorphism.
10. How to use command-line arguments in C++ ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Compare object oriented languages with conventional programming concepts.

Or

12. Generate a class named "Time" with data members "hours", "minutes" and "seconds". Initially parameters and write methods to read in data values and add two "Time" objects.

13. Explain use of objects as function arguments with examples.

Or

14. What are the parameter pass methods using the function ?

Turn over

15. Explain the friend functions and friend classes and how the overloaded functions.

Or

16. Discuss the use of Binary operator over loading and give examples.

17. What are the file stream classes and the operations defined for C++ files ?

Or

18. Explain the base classes and derived classes with visibility modes.

19. Differentiate Static and Dynamic memory allocations with suitable examples.

Or

20. What are pointers to base classes and pointers to derived classes ?

[5 × 12 = 60 marks]

F 3682 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Seventh Semester

Branch : Electrical and Electronics Engineering

BIOMEDICAL INSTRUMENTATION—(Elective I) (E)

(Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Briefly explain the physiology of respiratory system.
2. Explain with figure the conducting system of heart.
3. Differentiate between direct and indirect method of blood pressure measurements with examples.
4. What are the advantages of d.c. defibrillators ?
5. Briefly explain the principle of measurement of CO_2 of exhaled air.
6. Explain any *one* type of respirator with its use.
7. Briefly explain the characteristics of sleep with waveform.
8. Explain the functional organisation of the spinal nervous system.
9. Explain any *two* applications of surgical diathermy machines.
10. Distinguish between Computer Tomograph and Magnetic Resonance Imaging system.

(10 × 4 = 40 marks)

Part B

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

11. Draw the block diagram of an ECG recorder and explain how ECG is recorded. Draw the ECG waveform and analyze it.

(12 marks)

Or

12. What is a bipotential ? Explain in detail the generation of biopotentials. Draw the action potential waveform and explain how it is generated and propagated.

(12 marks)

13. (a) Explain the operation of a pacemaker and why it is needed. (6 marks)
    (b) What are the characteristics of blood flow ? (6 marks)

Or

14. (a) Explain how pH of blood is measured. (4 marks)
    (b) Describe with diagrams any *two* methods of temperature measurement of body parts. (8 marks)
15. Explain in detail with diagram different types of ventillators with their uses. (12 marks)

Or

Turn over

16. (a) Explain the operation of an inhalator with its use. (4 marks)

(b) Explain in detail any *two* method of respiration rate measurement. (8 marks)

17. Explain the anatomy of central nervous system with diagrams in detail. (12 marks)

Or

18. Explain in detail with diagram the functional organization of the brain. (12 marks)

19. Explain with block diagram the components of an NMR imaging system. (12 marks)

Or

20. Describe in detail any *two* types of electrotherapy equipment with their applications. (12 marks)

(5 × 12 = 60 marks)