G 1279 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL DRIVES AND CONTROL (E)

(Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries **4** *marks.*

1. Discuss the need of speed control of electric drives in industry. What is the type of motor for which speed control is easiest? Justify your answer.
2. Explain how harmonics are introduced in the supply system when solid state drives are used.
3. Draw the waveforms of a three-phase bridge rectifier.
4. What are the advantages of Chopper fed drives?
5. Compare the mechanical characteristics of three-phase slip ring and squirrel cage induction motors.
6. Discuss the principles of V/f control for a three-phase squirrel cage induction motor.
7. Explain the flux weakening scheme of control for a three-phase slip ring induction motor.
8. Discuss the variable frequency operation of a current source inverter.
9. Explain a self controlled synchronous motor drive using load commutated inverter.
10. Explain the principle of vector control for three-phase A.C. motors.

(10 × 4 = 40 marks)

Part B

Each question carries **12** *marks.*

11. With neat circuit diagrams explain the operation of a half controlled scheme for a D.C. motor. Draw the speed torque characteristics for various values firing angle.

Or

12. Draw the waveforms at the output of a fully controlled bridge rectifier drive. Derive the equations for showing the effect of firing angle on the output voltage.

Turn over

13. Draw and explain a dual converter fed D.C. motor drive. Discuss the circulating current mode operation

Or

14. Draw the diagram of a four quadrant Chopper fed drive. Explain the operation.

15. Explain the difficulties in speed control of three-phase induction motors using solid state devices. Explain the methods of stator fed speed control.

Or

16. With necessary diagrams discuss slip power recovery scheme for speed control of three-phase slip ring induction motors.

17. Explain a PWM inverter D.C. motor drive. Discuss the feedback loops in detail.

Or

18. Discuss the fixed frequency and variable frequency operation of current source inverter drives.

19. Explain with diagrams a self controlled synchronous motor drive with electronic commutation.

Or

20. Draw the diagram of a voltage source inverter drive for a synchronous motor with open loop control. Explain the operation of the circuit.

(5 × 12 = 60 marks)

G 1287 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

UTILISATION OF ELECTRICAL POWER (E)

(Improvement/Supplementary)

Time : Three Hours **Maximum : 100 Marks**

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Select a suitable type of motor for a textile mill. Justify your choice.
2. How speed control of the D.C. motors used in a steel re-rolling mill is done?
3. State the steps for calculating the tractive effort of an electric train.
4. Discuss the desirable characteristics of a traction motor.
5. What are the materials used for the heating element in resistance type electric heating? Why are these used?
6. Discuss the resistance welding process.
7. State the design criteria for factory lighting. What are the safety reasons and standards in this application?
8. Explain the principle of refrigeration.
9. Explain energy auditing process.
10. Discuss how electrical energy can be saved in an educational institution.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Draw the characteristics of typical DC and AC drives commonly used in lifts. State why they are suitable for this application.

Or

12. Explain different means of electric motor breaking. Mention advantage of each scheme.

Turn over

13. Discuss the factors affecting acceleration, constant speed running and retardation of electric trains.

Two locomotives are used in pulling a train. Their driving wheels are having diameters of 1.4 and 1.375 meters respectively. Both have a slip of 5% when exerting a tractive effort of 40000 N. How will they share a load requiring a tractive effort of 75000 N?

Or

14. Explain a scheme of electric traction for a 3000 kW electric locomotive showing the selection of motors and the control scheme

15. Compare the induction heating and dielectric heating schemes. Discuss applications for each.

Or

16. Discuss electronic welding control design and working.

17. State the laws of illumination. Draw and explain the construction of a mercury vapour lamp.

Or

18. Discuss the design steps for an air-conditioning system for a computer laboratory for accommodating 60 students.

19. What is energy management? Taking the case of a fertilizer factory, explain how energy management principles can be applied.

Or

20. Discuss the scope for utilizing wind energy in Kerala. Compare the use of wind energy with solar energy.

(5 × 12 = 60 marks]

G 1297 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

CONTROL SYSTEMS—II (E)

(Improvement / Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. When do we use lag compensator ?
2. What are the characteristics of a lag-lead compensator ?
3. What are the properties of z- transform ?
4. Define pulse transfer function. What is its significance ?
5. Write a note on dead-zone non linearity.
6. Define Describing function .
7. Define (a) state (b) state space and (c) state variable.
8. Define state transition matrix. What are its properties ?
9. What is controllability and observability ?
10. What is pole placement compensation ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 marks.

11. Design a compensating network for $G(s) = K / [s(1+0.1s)(1+0.01s)]$ for (i) phase margin of at least 35 and (ii) steady state error in the output position must be less than 2% of the final velocity.

Or

12. Explain with an example the steps involved in the design of a compensator using root-locus method.
13. Find the z- transforms of

(i) $f(k) = k^2 a^{k-1}$; $k \geq 1$

(ii) $f(k) = a^k \cos k\pi$

Or

14. Check for stability using Jury's test $z^{+4} - 1.7\,z^3 + 1.04\,z^2 - 0.268\,z + 0.024 = 0$.

15. Explain with an example the method of analyzing non-linear systems using phase plane method.

Or

16. Derive the describing function of the non linearity having saturation and dead-zone.

17. Derive a state model of the system described by $y'''(t) + 6y''(t) + 11y'(t) = 6y(t) = \dot{x}(t) + 5x(t)$.

Or

18. Derive the state transition matrix for the system $\dot{X} = AX$ where $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -3 \end{bmatrix}$

19. Determine the controllability and observability of the system represented by $\dot{X} = AX + BU$ and $Y = CX + DU$ where

$$A = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix}; B = [1, \ -1]^T; C = [1, \ 0]; D = [s]$$

Or

20. As discrete-time system is given by the difference equation

$y(k + 2) = 5y(k + 1) + 6y(k) = u(k)$; $y(0) = y(1) = 0$; $T = 1$ s.

Obtain a state model in canonical form. Find the output $y(k)$ if input $u(k) = 1$ for $k \geq 0$.

(5 × 12 = 60 marks)

G 1308 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

SYSTEM DESIGN WITH MICROCONTROLLERS (E)

(Improvement / Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Give a brief description of the register banks of 8051.
2. What are the various SFRs in 8051 ?
3. With examples describe the Single Bit Instruction in 8051.
4. What are the addressing modes of 8051 ?
5. Mention the various interrupts in 8051.
6. Explain briefly on interrupt driven data reception.
7. Show how a time delay can be designed using timers in 8051.
8. Draw the interfacing of DAC (808) to 8051.
9. Discuss briefly on Data Acquisition System.
10. Configure timer O in mode 2 and determine the time taken for overflow flag be raised if F_{osc}=12 MHz and T_{HO} is loaded with 90 h.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Describe the internal architecture of 8051 microcontroller bringing out its salient features.

(12 marks)

Or

12 Describe the formats and the functions of the various bits of the SFRs in 8051. (12 marks)

13 (a) Write a program using 8051 instructions to multiply two 8 bit unsigned numbers. (6 marks)

(b) Describe the flags in 8051 and the PSW register. (6 marks)

Or

Turn over

14. (a) Write a program to generate a square wave of 2 kHz frequency on pin P1.5 (Assume XTAL = 11.0592 mHz).

(8 marks)

(b) Explain the different modes of operation of timers. (4 marks)

15. (a) Write a small program to enable all the interrupts except serial interrupts. Show the structure of the program including the allocation of interrupt vector locations.

(6 marks)

(b) Discuss the interrupt priority in the 8051 and setting the interrupt priority with the I pregester.

(6 marks)

Or

16 (a) What are the various modes of serial communication ? (4 marks)

(b) Write a program to transfer the message "YES" serially at 9600 band, 8 bit data, 1stop bit.

(8 marks)

17 (a) Draw the 8051 connection to external 8K × 8 Data RAM. (6 marks)

(b) Write a program to read 200 bytes of data from P1 and save the data in external RAM starting at RAM location 5000H.

(6 marks)

Or

18. Explain with neat diagram the connection of a parallel ADC (0808) to 8051. Write a typical program to read an analog input connected to the ADC.

(12 marks)

19. Write a program to measure the frequency of an input signal that range from 500Hz to 2.0 kHz Assume a clock frequency of 6.00 MHz. The input signal is connected to one of the T_0 pin of 8051.

(12 marks)

Or

20. (a) Draw the block diagram of a temperature control system using 8051. (6 marks)

(b) Discuss the basic configuration of PLCs. (6 marks)

(5 × 12 = 60 marks)

G 1332 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

OBJECT ORIENTED PROGRAMMING (Elective I) (E)

(Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What is meant by dynamic binding? How is it useful in OOP?
2. What are the advantages of function prototypes in C++?
3. What are the properties and uses of static member functions?
4. What are the properties of the constructor functions?
5. How is matching done in case of overloaded functions?
6. Explain with examples the overloading of binary operators.
7. Differentiate between privately and publicly derived visibility modes.
8. What are the two methods of opening files? Compare their characteristics.
9. What are the applications of this pointer?
10. Explain with an example the implementation of dynamic binding.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Write an account on object oriented languages.

Or

12. Explain with examples the usage and advantages of public and private member functions.
13. Explain with an example the uses of object arrays.

Or

14. Write a C++ program to illustrate that destructors are invoked implicitly by the compiler.

Turn over

15. Explain with a C++ program the implementation of function overloading.

Or

16. Write a programme to demonstrate operator overloading in C++.

17. Explain how multilevel inheritance is implemented.

Or

18. What is a file mode? Describe the various file mode options available.

19. Illustrate how pointers can be used to a derived object.

Or

20. Explain how runtime polymorphism is achieved in C++.

(5 × 12 = 60 marks)

G 1333 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

BIOMEDICAL INSTRUMENTATION (Elective I) (E)

(Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Draw the typical ECG waveforms and explain.
2. Briefly explain the physiology of cardiopulmonary systems.
3. Explain how the pH of blood is measured.
4. Explain the method of measurement of skin temperature.
5. Briefly explain the physiology of respiratory systems.
6. What are respirators? Explain.
7. Briefly explain the neuronal communication.
8. Explain the characteristics of sleep.
9. List the NMR components and explain the RF transmitter system.
10. Explain any *one* type of dialyser.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Draw the block diagram of an ECG recorder and explain in detail the ECG recording.

(12 marks)

Or

12. Describe resting potential, action potential and the propagation of action potential with the action potential waveform.

(12 marks)

Turn over

13. Explain any *three* indirect methods of blood pressure measurement.

(12 marks)

Or

14. (a) Explain the characteristics of blood flow.

(b) Describe the different types of Pacemakers with diagram.

(4 + 8 = 12 marks)

15. Explain with block diagram the CO_2 method of respiration rate measurement. What are its uses ?

(12 marks)

Or

16. (a) Draw the functional block diagram of a positive pressure ventilator and explain.

(b) Explain the blood PO_2 measurement with its advantages.

(4 + 8 = 12 marks)

17. Explain the 10–20 electrode system of EEG measurement with necessary diagrams.

Or

18. (a) Describe in detail the anatomy of the nervous system.

(b) Briefly explain the somatic nervous systems.

(8 + 4 = 12 marks)

19. Explain with diagram any *three* applications of lasers.

(12 marks)

Or

20. (a) Explain the principle of ultrasonic imaging systems.

(b) Explain with diagram the surgical diathermy machine with its uses.

(5 + 7 = 12 marks)

[5 × 12 = 60 marks]

G 1270 (Pages : 3) Reg. No. EEE

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—III (E)

(Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the various types of Induction Machines ? Discuss their salient features.
2. What is meant by crawling ? How it can be eliminated ?
3. Draw the torque slip characteristics of 3-phase induction machine. Show the effect of change in rotor resistance.
4. Explain the term single phasing of 3-phase induction machines.
5. What is the condition for an induction machine to work as a Generator ? What are its Applications ?
6. How single phase induction machine can be started ? What are the various types ?
7. Compare the characteristics of Repulsion start and Repulsion run induction motors.
8. What is a Hysterisis motor ? Explain.
9. Explain the advantages of Deep bar induction motors. How the performance can be improved by deep bar construction ?
10. How commutator machines can be used as phase advancers ?

(10 × 4 = 40 marks)

Part B

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

11. The real power input to a 415 V, 50 Hz, 6 pole 3-phase Induction motor running at 970 rpm is 41 kW. The input power factor is 0.9. The stator losses amount to 1.1 kW and mechanical losses total 1.2 kW. Calculate :

    (a) Line current (b) Slip
    (c) Rotor copper loss (d) Mechanical power output
    (e) Efficiency and (f) Torque.

(12 marks)

Or

12. (a) 415 V, 50 Hz, delta connected 3-phase induction motor gave the following test results :

No load test : 415 V, 9.1 A, 1200 W.

Locked rotor test : 120 V, 16.8 A, 1470 W.

Stator resistance per phase = 2.51 Ω. Find the parameters of the equivalent circuit.

(8 marks)

(b) Prove that the ratio of rotor input, rotor copper loos and mechanical power developed will be 1 : s : (1 – s) is a 3-phase induction motor.

(4 marks)

13. (a) Explain the rotor resistance control methods for the speed control of 3-phase induction motors.

(8 marks)

(b) Why is pole changing method of speed control not used with wound rotor motors ? Explain.

(4 marks)

Or

14. A 15 kW, 415 V, 6 pole, 50 Hz, 3-phase induction motor runs at 965 rpm on full load with an efficiency of 89% and a power factor of 0.87 lagging. In the blocked rotor test the full load current was circulated with a line voltage of 80 V. If the motor is to be started by means of a star-delta starter, find approximately the starting current taken from the supply lines and starting torque developed.

(12 marks)

15. What is a synchronous induction motor ? Explain its construction and the rotor winding connections. How the performance can be predicted from its circle diagram ?

(12 marks)

Or

16. With the help of revoking field theory obtain the equivalent circuit, characteristics and performance equations of a single phase induction motor.

(12 marks)

17. (a) Explain the principle of operation of single phase series motors. Describe its characteristics and application.

(8 marks)

(b) Describe the principle of a Universal motor.

(4 marks)

Or

18. (a) Describe the construction, working and uses of a reluctance motor.

(6 marks)

(b) Explain the principle of operation of Repulsion motor. For what types of loads is this motor suitable ?

(6 marks)

19. A double cage induction motor (4 pole, 50 Hz, 415 V, delta connected, 3-phase) has the following equivalent circuit parameters, all of which are per phase values referred to stator :

Stator winding : $R_1 = 1\ \Omega$, $X_1 = 2.5\ \Omega$, Outer cage $R_0' = 2.5\ \Omega$, $X_0' = 0.8\ \Omega$, Inner ca $R_i' = 0.6\ \Omega$ $X_i' = 4.5\ \Omega$. Calculate the starting torque and running torque at a slip of 4 The shunt branch current may be neglected.

(12 marks

Or

20. Write short notes on :

(a) Characteristics and applications of Schrage Motor.

(b) Principle of operation of Linear Induction Motor.

(2 × 6 = 12 marks)

[5 × 12 = 60 marks]

G 1349 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL DRAWING (Elective I) (E)

(Improvement/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 a developed winding diagram for a 16 slots, double layer d.c. lap winding. Make provision for equaliser rings.

2. Draw to a convenient scale the end and longitudinal elevation (top half in section) for a 100 kW, 500 volt, 1250 r.p.m., 6 pole shunt generator. The armature is supported over the spider and the shaft is supported by means of pedestal bearing for the dimensions given below :

   Diameter of armature = 75 cm
   Length of armature = 27.8 cm
   No. of slots = 86
   Size of slot = 1.11 × 5.24 cm
   Depth of iron behind the slot = 9.26 cm
   Ventilating ducts No.3, each 1 cm wide.
   Air gap length below main pole = 0.5 cm

   Main pole :
   Breadth = 17.75 cm
   Height = 24 cm with shoe.
   Length = 25.7 cm

   Interpole :
   Breadth = 4.63 cm
   length = 20 cm
   Air gap length below interpole = 0.8 cm

Turn over

Yoke :

Thickness of yoke = 7.5 cm

Length of yoke = 40 cm

Commutator :

No. of commutator segments	= 344
Diameter of commutator	= 56 cm
Segment pitch	= 0.51 cm
Length of commutator	= 12.35 cm
No. of brushes/spindle	= 3
Shaft diameter below armature	= 9 cm
Shaft length between bearing centres	= 120 cm

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

Core width	: 14 cm
Core depth	: 37 cm
Core height	: 38 cm
Core length	: 54 cm
Window size	: 13 × 24 cm
L.V. coil	: 4
H.V. coil	: 4
No. of turns in L.V. per coil	: 10
No. of turns in H.T. per coil	: 40
Cross section of H.T. conductor	: 28 sq.mm.
Cross section of L.T. conductor	: 125 sq.mm.
Average height of one turn	: 1.8 cm.

(2 × 25 = 50 marks)

Part B

4. Give the layout of a double layer lap winding for a 3-phase, 8 pole, 54 slot armature.

Or

5. Draw the top half sectional end and sectional elevation of a 5 H.P. squirrel cage induction motor rotor of directly mounted type. The end ring is shaped in such a way that it also serves the purpose of a fan. The shaft is supported between the two end shield bearings :

Stator inside diameter	= 15 cm
Length of stator	= 9 cm
Air gap length	= 0.045 cm
Stator total slots	= 36
Length of stator	= 9 cm
Outside diameter of stator	= 24 cm
Size of slot, depth	= 2.4 cm (taper type)
Width of teeth	= 0.6 cm

Rotor has 30 slots of rectangular type with a parallel side of size.

1.05 cm × 0.575 cm

Other missing data may be assumed.

6. Draw a half sectional elevation and end view of a salient pole alternator of 500 KVA. Stator laminated has a 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 stator coil in each side	= 16 cm
Diameter of rotor	= 107.2 cm

Show clearly in drawing :

(a) Method of fixing the rotor pole over the spider.

(b) Stator and frame construction.

The shaft is supported by means of two pedestal bearings 160 cm apart.

Other missing data may be assumed.

(2 × 25 = 50 marks)