G 623 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL DRIVES AND CONTROL (E)

(Old Scheme—Prior to 2010 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Write down the basic features and characteristics of an electric drive.
2. With a suitable waveform explain the discontinuous mode of operation of a 1-phase fully controlled DC drive.
3. Describe briefly the operation of four quadrant dual converter fed DC drive.
4. Draw and explain the torque slip profile of an induction motor for different voltages.
5. How will you achieve the rotor voltage control of wound rotor induction motor by thyristors ?
6. What are the various controller configurations for the stator voltage control of 3-phase induction motors ?
7. Give the schematic of a PWM drive. What are the advantages of PWM ?
8. Compare the VSI and CSI fed induction motor drives.
9. Discuss the principle of vector control for 3-phase AC motors.
10. What are the various speed control techniques for synchronous motors ?

(10 × 4 = 40 marks)

Part B

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

11. (a) Draw and explain the block diagram of a separately excited d.c. motor drive. Discuss the important performance parameters involved. (8 marks)

    (b) Discuss the principle of freewheeling and regeneration 1 W controlled bridge rectifier d.c. drives. (4 marks)

Or

Turn over

12. (a) Discuss the operation of a single-phase full controlled bridge rectifier fed separately excited d.c. motor with necessary circuit diagram and waveforms.

(6 marks)

(b) A single-phase bridge rectifier (fully controlled) fed from a 250 V, 50 Hz supply is used to control the speed of a separately excited d.c. motor with armature resistance of 1.5 Ω and inductance 30 mH. Buk e.m.f. at one speed of operation is 100 V and converter control angle is 30°. Determine the average and r.m.s. values of armature current, power input to the motor and power factor of operation.

(6 marks)

13. (a) With neat sketch explain the speed control of chopper fed DC motor drive. (6 marks)

(b) A d.c. chopper feeds a d.c. series motor. The supply voltage to the chopper is 500 V. The total current is found to vary between two limits having a difference of 15 A. The time ratio of chopper is 0.6 and its pulse frequency 80 cycles/s. Determine the armature inductance of the motor.

(6 marks)

Or

14. With necessary circuit diagram and waveforms explain the operation of a 3-phase fully controlled bridge rectifier fed separately excited DC motor. Derive the performance parameters.

(12 marks)

15. (a) Discuss the stator voltage control of three-phase induction motor and its applications.

(6 marks)

(b) What are the various slip power recovery schemes ? (6 marks)

Or

16. Describe the principle and working of u/f control of three-phase induction motors. Describe constant torque and constant power control.

(12 marks)

17. Discuss the v/f, e/f and flux weakening schemes of control of inductor motor drives. Give the applications.

(12 marks)

Or

18. Explain the application of CSI to induction motor drives. (12 marks)

19. Explain the operation of VSI fed synchronous motor drive with open loop control with neat diagram.

(12 marks)

Or

20. Describe the self controlled synchronous motor drive with electronic commutation. (12 marks)

[5 × 12 = 60 marks]

G 655 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

SYSTEM DESIGN WITH MICROCONTROLLERS (E)

(Old Scheme—Prior to 2010 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Compare the features of a microcontroller to that of a microprocessor.
2. Explain the functions of a program counter and PSW in 8051 microcontroller.
3. Explain the single bit instructions in 8051 with examples.
4. Explain the generation of time delay using subroutines. Give an example of a delay subroutine.
5. What are the various modes of operation of Timers in 8051 ? Briefly explain.
6. What are the various sources of interrupts in 8051 ? Explain briefly.
7. Draw the interfacing of an External RAM (8 k *x* 8 data RAM) to 8051 microcontroller.
8. Explain the interfacing of 7 segment display with 8051 microcontroller. Draw the diagram.
9. What is meant by Data Acquisition systems ? Explain any Data Acquisition system for a stand alone micro-controller system.
10. Discuss the basic configuration of PLCs.

(10 × 4 = 40 marks)

Part B

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

11. Describe with a neat block diagram the architecture of 8051 microcontroller. Explain the functions of each block.

(12 marks)

Or

Turn over

12. (a) Explain the various Special Function Registers (SFRs) in 8051 and their functions. (8 marks)

(b) Discuss the Register Banks in 8051. (4 marks)

13. (a) What are the various addressing modes in 8051 ? Give one example of each. (6 marks)

(b) What are the various Jump and Call instructions in 8051 ? (6 marks)

Or

14. (a) Write a program to generate 2 kHz square wave on Pin P 1.0 of port 1. (6 marks)

(b) Write a program to find the square root of a number. (6 marks)

15. (a) Mention the applications of Timers and Counters in 8051. (5 marks)

(b) Write a program to count the frequency of an input signal that ranges from 500 Hz to 2.0 kHz. Assume a clock frequency of 6.00 MHz. The input signal is connected to Pin To of 8051. (7 marks)

Or

16. (a) Discuss briefly the methods of serial communication. (5 marks)

(b) Write a program to configure the 8051 in mode 0. Send the data values stored in locations 700 h to 70 Bh through the serial port to an external serial device. (7 marks)

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

(b) Show how an ADC (0 808) can be interfaced to 8051. (6 marks)

Or

18. With necessary interfacing diagram and program describe how an LCD module can be connected to 8051. (12 marks)

19. With a neat block diagram, explain how will you design a typical microcontroller system for the measurement of frequency of an input signal. (12 marks)

Or

20. Design a typical temperature control system using an 8051 microcontroller. (12 marks)

[5 × 12 = 60 marks]

G 680 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

BIOMEDICAL INSTRUMENTATION (Elective I) (E)

(Old Scheme – Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Explain the term "sodium pump" related to biopotentials.
2. Explain any *one* type of reference electrode.
3. What is meant by Korothoff sound?
4. Explain any *one* method for measurement of pH of blood.
5. How the respiration rate can be measured?
6. What is meant by ventillators?
7. What do you understand by spinal reflexes?
8. How the measurements from nervous system can be done?
9. Explain the properties of ultrasound.
10. Which are the different therapeutic equipments used in biomedical system?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Explain the different types of ECG recorders.

Or

12. Briefly explain the different types of biopotential electrodes.
13. Explain any *one* method of direct measurement of blood pressure.

Or

14. Draw the waveform showing blood pressure variations in heart.

Turn over

15. Explain any *one* method of CO_2 measurement.

Or

16. Explain the respiratory therapy equipment.

17. Explain the sequence of events during chemical transmission across a synapse.

Or

18. How the EEG measurement is done and how it is helpful in diagnosis?

19. Explain the magnetic resonance imaging system.

Or

20. What are therapeutic instruments and brief some of them.

(5 × 12 = 60 marks)

G 697 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL DRAWING (Elective I) (E)

(Old Scheme – Prior to 2010 Admissions)

[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. A 4 pole simplex wave wound armature has 25 slots and 25 coils. The commutator has 25 segments. Work out the winding details and draw the winding diagram. Also draw the sequence diagram to show the position of the brushes.

2. Draw to a suitable scale a neat and sectional view of the following as per main dimensions given below in centimeter scale. Winding of the field and armature need not be shown :

   DC, 6 pole, 150 H.P. motor

   Armature diameter = 55

   Number of lots = 61

   Size of slot = 1 × 4.5

   Slot one type

   Depth below slot = 9

   Commutator diameter = 42

   Number of commutator bias = 244

   Air gap length (radial) = 0.5 at main pole and 0.6 at inter pole

   Main pole laminated, breadth 14m, arc 20, height with shoe 21, Inter pole breadth = 4

   Outside diameter of yoke = 115

   Shaft diameter at bearing = 10

   The method of fixing the pole lamination and the pole to the yoke should be clearly shown.

Turn over

3. Sketch the sectional plan and elevation of the core and yoke assembly of 15 KVA, 3-phase, 1000/415-V core type transformer. The main dimensions are given below :

   Core diameter = 22 cm

   Height of core = 50 cm

   LV winding in one layer with height = 42.5 cm

   HV winding in one layer with height = 42.5 cm

   Show suitable spacers and position for L.V and H.V. winding arrangement.

(2 × 25 = 50 marks)

Part B

4. A double layer lap winding is to be made for a three-phase 4 pole machine having 24 slots in its armature. The coil span is reduced by one slot. Draw the developed winding diagram.

5. Draw to a suitable scale the half sectional front and elevation views of a 20 kVA, 4 pole, 3-phase salient pole alternator with following main dimensions :

Outer diameter of the motor	=	50 cm
Stator inner diameter	=	25 cm
Number of stator slots	=	48
Yoke width	=	3 cm
Rotor diameter	=	24 cm
Rotor length	=	16 cm

   Shaft = 3 cm dia with ball bearing, rotor is provided with damper winding ; motor height = 52 cm, motor length = 28 cm.

6. Draw to quarter scale a half sectional longitudinal view and half sectional end view of the squirrel cage motor with the following main dimensions ;

   External diameter of stator stamping = 69 cm

   Inside diameter of stator stamping = 45 cm

   Stator core length = 20 cm

   The stator has 54 slots each of 6 cm × 1.5 cm section and the winding overhang 5 cm on each side.

   External diameter of rotor stampings = 44.75 cm

   Inside diameter of rotor stamping = 25 cm

   Rotor has 43 slots, each carrying a bar of 1.5 × 1.2 cm section

   The end rings have a section of 0.75 × 3.5 cm

   The rotor is mounted on a spider fixed to the shaft by a key.

   Shaft diameter = 5 cm.

   Total height of the motor = 81 cm

   The motor has ball-bearings carried by end shield.

   Assume dimensions of the motor frame.

(2 × 25 = 50 marks)

G 704 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 701—ELECTRICAL POWER TRANSMISSION (EE)

(Improvement/Supplementary)

[2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What do you mean Electrostatic induction.
2. Derive the performance equation for short transmission line.
3. Explain one method to find fault in U.G. cables.
4. Write the advantages and disadvantages of corona.
5. Explain TCSR with neat ckt. diagram.

(5 × 3 = 15 marks)

Part B

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

6. Derive the equation for capacitance of 3-phase line with equilateral spacing.
7. Derive the ABCD constants for medium lines using nominal 'Pi' method.
8. Derive equation for sag in long line transmission system.
9. Explain the radio interference of corona and interference between communication lines.
10. Explain statcom.

(5 × 5 = 25 marks)

Turn over

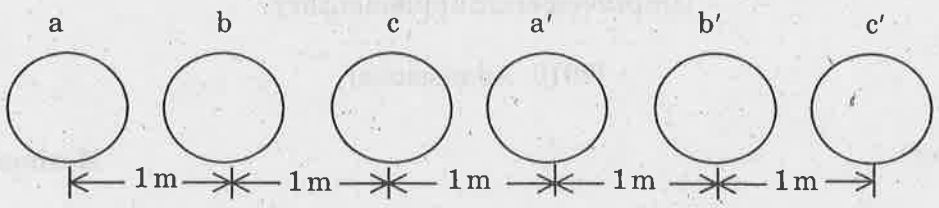
Part C

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

11. Derive the equation for capacitance of 3-phase line with unsymmetrical spacing but fully transposed.

Or

12. A double circuit 3-phase line shown below. The conductors aa′, bb′, cc′ belong to the same phase respectively. The radices of each conductor is 1.5 cm. Find the inductance of the double circuit line in MH/KM/phase.



13. Derive the equation for powerflow through long transmission lines.

Or

14. A 3-phase OH line 200 m km long has resistance = 0.16 Ω/km and conductor dia a 2 cm with spacing 4 m, 5 m, 6 m transposed. Find (a) ABCD constants ; (b) the Vs, Is, Pfs, Ps when the line is delivering full-load of 50 MW at 132 kv and 0.8 pf lag ; (c) efficiency of transmission ; (d) the receiving end voltage regulation.

15. (i) What are the effects of ice and wind loading in long transmission lines ? (ii) What do you mean by testing of insulators ? Explain.

Or

16. A transmission line over a hillside where the gradient is 1 : 20 is supported by two 22 m. high towers with a distance of 300 m between them. The lowest conductor is fixed 2 m below the top of each tower. Find the clearance of the conductor from the ground. Given that conductor weighs 1 kg/m and the allowable tension is 1500 kg.

17. What is corona. Derive the equation for disruptive critical voltage and visual corona ?

Or

18. Explain different types of substations. But bar arrangement in substations and diff equipments in different substations.

19. Explain HVDC links with neat sketches.

Or

20. What are the major objectives of Flexible A.C. transmission system. Explain some important FACTS devices with neat sketch.

(5 × 12 = 60 marks)

G 728 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 703—DRIVES AND CONTROL (EE)

(Improvement/Supplementary)

[2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Discuss about the classifications of load torque.
2. Draw the speed torque characteristics of a single-phase half controlled rectifier fed separately excited motor.
3. What are the features of variable frequency control ?
4. What is meant by slip power recovery scheme ?
5. What are the limitations of 25 kV AC traction using transformer with tap changer.

(5 × 3 = 15 marks)

Part B

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

6. What are the components of load torque ?
7. Explain about the speed reversal carried out in the non-simultaneous control method of dual converter fed drive.
8. A three-phase 440 V, 1000 r.p.m. slip ring induction motor is operating with 4 % slip. Stator current is 30 A. Calculate the stator current if the speed of the motor is reduced to 500 r.p.m. using stator voltage control method.
9. Explain the dynamic braking of CSI fed drive.
10. Explain the principle of synchronous motor control.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Derive the equivalent values of drive parameters for a load undergoing rotational and translational motion. (8 marks)

    (b) Derive the expression for fundamental torque. (4 marks)

Or

12. With neat circuit diagram and relevant waveforms, explain the operation of single-phase half wave controlled rectifier fed d.c. separately excited motor.

13. With neat circuit diagram and relevant waveforms explain the operation of three-phase half controlled bridge rectifier fed d.c. motor drive.

Or

14. Explain the operation of chopper control of d.c. series motor.

15. Explain in detail about stator voltage control of induction motor drive.

Or

16. Explain in detail about the v/f control of induction motor drives.

17. (a) Discuss the principle of vector control. (6 marks)

    (b) Briefly discuss about the slip speed control. (6 marks)

Or

18. A 440 V, 50 Hz, 970 r.p.m., 6 pole, Y-connected 3-phase wound rotor induction motor has following parameters referred to the stator. $R_S = 0.1\ \Omega$, $R'_r = 0.08\ \Omega$, $X_S = 0.3\ \Omega$, $X'_r = 0.4\ \Omega$. The stator to rotor turns ratio is 2. Motor speed is controlled by static Scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is 165°. Calculate :

    (a) Transformer turns ratio.

    (b) Torque for a speed of 780 r.p.m. and $\alpha = 140°$.

    (c) Firing angle for half the rated motor torque and speed of 800 r.p.m..

    The d.c. link inductor has a resistance of 0.01 Ω.

19. Explain AC traction using PWM VSI squirrel cage induction motor drive.

Or

20. Explain in detail about the operation of VSI fed synchronous motor drive.

[5 × 12 = 60 marks]

G 749 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 705—COMMUNICATION ENGINEERING (EE)

(Improvement/Supplementary)

[2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define the terms (a) Amplitude modulation ; and (b) Frequency modulation.
2. What is meant by interlaced scanning ?
3. What is the duty cycle of a radar with a PW of 3 μS and a PRT of 6 ms ?
4. Define the terms (a) posigrade orbit ; and (b) retrograde orbit.
5. Draw the block diagram of a uplink model of a satellite system.

(5 × 3 = 15 marks)

Part B

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

6. What are the advantages of RF amplifier ?
7. Explain what is meant by I and Q signals to colour TV and why they are generated.
8. Give a block schematic of Radar system and briefly discuss.
9. With block diagram, explain a typical satellite communication system.
10. What is meant by amplitude shift keying ? Determine the band and minimum bandwidth necessary to pass a 10 kbps binary signal using amplitude shift keying.

(5 × 5 = 25 marks)

Part C

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

11. With block diagram, explain FM transmitter. Explain how frequency stability is obtained.

Or

12. Explain the operation of balanced ratio detector and show how it is derived from basic circuit. Explain the improvement effected by each of the changes.

13. Explain in detail about a colour TV transmitter.

Or

14. Explain about the synchronizing pulse, blanking pulse and equalising pulse.

15. Explain the working of MTI Radar with block schematic.

Or

16. (a) Derive the basic radar range equation, as governed by the minimum receivable echo power, P_{min}.

(8 marks)

(b) Calculate the maximum range of a radar system which operates at 3 cm. with a peak pulse power of 500 kW, if its minimum receivable power is 10^{-13} W, the capture area of its antenna is 5 m^2 and the radar cross-sectional area of target is 20 m^2.

(4 marks)

17. Briefly describe the operation of CDMA multiple accessing system.

Or

18. Explain in detail about the satellite uplink and downlink modeling.

19. Explain in detail about the binary phase shift keying and binary modulation.

Or

20. Explain in detail about Adaptive digital coding and PAM.

[5 × 12 = 60 marks]

G 769 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 706 L01—HVDC TRANSMISSION (Elective II) (EE)

(Improvement/Supplementary—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. List the advantages and disadvantages of HVDC transmission.
2. What are the desired features of converter control?
3. Discuss the functions of DC reactors in converter stations.
4. What are the sources of Reactive Power?
5. Discuss the applications of MTDC systems.

(5 × 3 = 15 marks)

Part B

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

6. Discuss the properties of converter transformers.
7. Compare constant current and constant voltage schemes of control.
8. What is Arc back and what are its causes?
9. Discuss the factors on which reactive power requirements of a converter station depend.
10. Compare the two types of MTDC systems.

(5 × 5 = 25 marks)

Part C

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

11. (a) Sketch and explain the configuration of six pulse bridge converter circuit. (8 marks)

    (b) Discuss the different types of DC Links. (4 marks)

Or

Turn over

12. (a) Describe the various aspects of comparison between High voltage AC and DC transmission systems.

(8 marks)

(b) Discuss the modern trends in Thyristor valves. (4 marks)

13. Explain actual control characteristics. With necessary equations, explain how power flow through an HVDC link can be controlled.

(12 marks)

Or

14. Discuss the limitations of manual control. Explain the following methods of converter control :—

(a) Constant extinction angle control.

(b) Firing angle control methods.

(12 marks)

15. (a) Explain Commutation failure in inverters. (8 marks)

(b) Discuss the causes of overvoltages in HVDC systems. (4 marks)

Or

16. Explain the overvoltage protection schemes employed in HVDC systems. (12 marks)

17. Write short notes on following :—

(a) Static VAR systems. (6 marks)

(b) Characteristic Harmonics. (6 marks)

Or

18. (a) Discuss the assumptions required for design of filters in converter stations. (6 marks)

(b) Explain the working of Thyrister switched capacitor. (6 marks)

19. Draw and explain the configuration of MTDC system with parallel connected converters.

(12 marks)

Or

20. Explain the mathematical modelling of DC and AC networks. (12 marks)

[5 × 12 = 60 marks]

G 613 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES – III (E)

(Old Scheme – Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Explain the principle of operation of three-phase induction motor.
2. Explain Cogging and how is it eliminated.
3. Discuss the method of increasing the starting torque of slip ring induction motor.
4. Explain Cascading of induction motors.
5. Discuss the types of Induction generators.
6. Explain the principle of shaded pole motor.
7. What is a Universal motor? How is it reversed?
8. Write a note on reluctance motor.
9. Discuss the applications of Scharage motor.
10. Draw and explain the equivalent circuit of double cage induction motor.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 *marks.*

11. (a) Draw and explain the equivalent circuit of three-phase induction motor.

    (b) A three-phase, 50 Hz 4 pole, 18 kW induction motor has friction and windage losses of 2.5 percent of the output. The full load slip is 4%. Calculate the rotor input, shaft torque and the gross torque.

(6 + 6 = 12 marks)

Or

Turn over

12. A three-phase, 200 V, 3.73 kW star connected induction motor gave the following test results :

Test		*Line voltage*	*Line current*	*Total input*
No load	...	200 V	5 A	300 W
Blocked rotor	...	100 V	26 A	1600 W

Draw the circle diagram and find the following :

(a) Line current and power factor at full load.

(b) Maximum torque and corresponding slip.

(c) Maximum output and Maximum input.

(12 marks)

13. (a) Explain rotor resistance starting and design of rotor resistance starter.

(b) Discuss the various methods of speed control from stator side.

(6 + 6 = 12 marks)

Or

14. (a) Explain the performance of three-phase induction motor when single phasing occur during operation.

(b) A 3-phase, 400 V, 6 pole, 15 hp delta connected induction motor runs at 960 r.p.m. on full load. If it takes 86 A direct starting, find the ratio of starting torque to full load torque with a star-delta starter. Full load efficiency and power factor are 85% and 0.86 respectively.

(6 + 6 = 12 marks)

15. (a) Explain the working of single-phase induction motor using double revolving field theory.

(b) Draw and explain the circle diagram of synchronous induction motor.

(8 + 4 = 12 marks)

Or

16. (a) Explain the different types of connection of rotor windings in synchronous induction motor. Compare their performance.

(b) Draw and explain the torque slip curve of single-phase induction motor.

(8 + 4 = 12 marks)

17. (a) Explain the construction and operation of Repulsion motor.

(b) Write short note on hysterisis motor.

(8 + 4 = 12 marks)

Or

18. (a) With phasor diagram and circuit model, explain the operation of single-phase series motor.

(b) Discuss the applications of Universal motors.

(8 + 4 = 12 marks)

19. (a) With phasor diagrams, explain the effect of injecting e.m.f. at various angles into secondary circuit of induction motor.

(b) What is the need of tertiary winding in Schrage motor?

(8 + 4 = 12 marks)

Or

20. (a) Explain the construction and operation of Linear Induction motor.

(b) What is a Compensated induction motor?

(8 + 4 = 12 marks)

[5 × 12 = 60 marks]

G 643 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

CONTROL SYSTEM—II (E)

(Old Scheme—Prior to 2010 Admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the circuit of a lag compensator and derive its transfer function.
2. Sketch and explain the Bode plots of a lead compensator.
3. Find the z transform of $\cos wt$.
4. Determine the inverse z transform of $\frac{z-4}{(z-1)(z-2)^2}$.
5. Sketch the input-output characteristics of a dead zone and saturation non-linearity and write down its describing function.
6. Explain the concept of phase plane analysis.
7. What is state transition matrix ? What are its properties ?
8. Prove the non-uniqueness of state models of a system.
9. Derive the relation between transfer function and state model.
10. Obtain a state model for the system described by $y(k+2) + 6y(k+1) + 4y(k) = u(k)$.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. The open loop transfer function of a unity feedback system is $\frac{k}{s(s+2)^2}$. Design a lead compensator to have a phase margin at least 50° and velocity error co-efficient $20s^{-1}$.

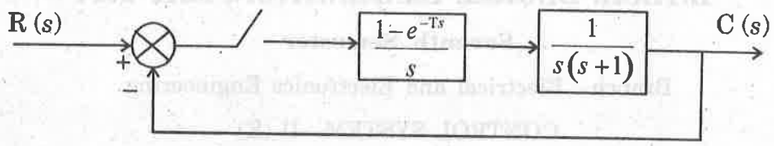
(12 marks)

Or

12. Explain the design of a lag lead compensator using root locus technique. (12 marks)

Turn over

13. Find the closed loop response of the system shown below. Input is unit step and T = 1 sec.

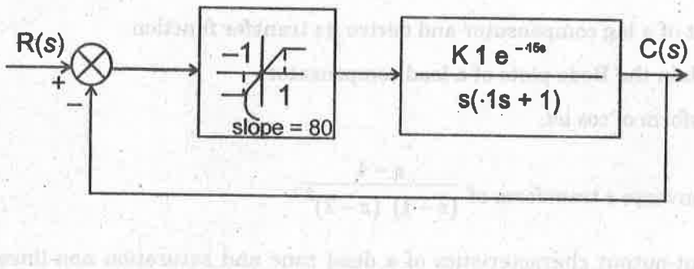


(12 marks)

Or

14. Explain Jury's stability test. Illustrate with an example. (12 marks)

15. Investigate the stability of the system shown below :



(12 marks)

Or

16. Construct the phase trajectory of the system given by $\frac{dx_2}{dx_1} = \frac{4x_1 + 3x_2}{x_1 + x_2}$. Comment on its stability.

(12 marks)

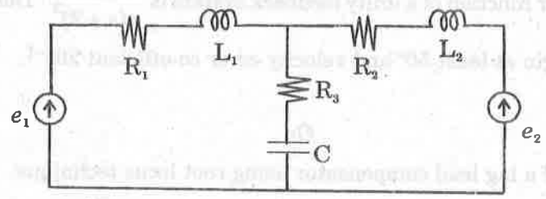
17. Solve the state equations given by :

$$\dot{X} = \begin{bmatrix} 0 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix} X,\ X(0) = [0\ \ 1\ \ 0]^T.$$

(12 marks)

Or

18. Obtain a state model for the system shown below :



(12 marks)

19. A system is given by $\dot{X} = \begin{bmatrix} -1 & 0 & 0 \\ 1 & -2 & 0 \\ 2 & 1 & -3 \end{bmatrix} X + \begin{bmatrix} 10 \\ 1 \\ 0 \end{bmatrix} u$. Design a state feedback controller to place the closed poles at $-1 \pm j2, -6$. (12 marks)

Or

20. Obtain a state model for a system given by $y(k+2) + y(k+1) + 0.16y(k) = u(k+1) + 2u(k)$ and find the state transition matrix.

(12 marks)

[5 × 12 = 60 marks]

G 716 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 702—SYNCHRONOUS MACHINES (EE)

(Improvement/Supplementary)

[2010 admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define chording factor and what are its advantages.
2. Define voltage regulation.
3. What are the functions of damper windings in synchronous machines ?
4. What is Reluctance power ?
5. Discuss about exciter ceiling voltage.

(5 × 3 = 15 marks)

Part B

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

6. Classify the types of armature windings in alternators.
7. Draw and explain the circuit model of alternator.
8. Explain synchronising current and synchronising power.
9. Discuss the effect of excitation on armature current and powerfactor of synchronous motor.
10. Explain the functions of excitation systems and the methods to increase their response.

(5 × 5 = 25 marks)

Part C

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

11. (a) Derive the EMF equation of alternator. Discuss the effect of harmonics on pitch and distribution factors.

(8 marks)

Turn over

(b) A three-phase, 16 pole alternator has 144 slots and 10 conductors per slot. The coils are short chorded by 1 slot. Find pitch factor and distribution factor. (4 marks)

Or

12. (a) Explain and compare the types of rotor construction in alternators. (8 marks)

(b) An alternator has 18 slots/pole and the first coil lies in slots 1 and 16. Calculate the pitch factor for the fundamental and the third harmonic. (4 marks)

13. (a) Explain slip test on salient pole alternator. (6 marks)

(b) A 50 kVA, 440 V, 3-phase, star connected alternator has armature resistance of 0.25 Ω/phase, synchronous reactance of 3.2 Ω/phase and leakage reactance of 0.5 Ω/phase. Determine (i) internal emf (E) ; (ii) no load emf (Eo) and the percentage regulation at rated load and upf. (6 marks)

Or

14. (a) Explain the effects of armature reaction in alternators. (6 marks)

(b) A 3-phase, star connected alternator is rated 20 kVA, 400 V and supplies load at 0.8 pf lag. The generator has resistance 0.5 Ω/phase and direct axis and quadrature axis reactances of 4Ω and 2Ω respectively/phase. Calculate the load angle and voltage regulation. (6 marks)

15. (a) Explain with diagram, parallel operation of three-phase alternators. (6 marks)

(b) A 11 kV, 3-phase, star connected synchronous motor draws a current of 60 A. The effective resistance and reactance per phase are 1 Ω and 30 Ω respectively. Find the induced emf for a power factor of 0.8 lag and lead. (6 marks)

Or

16. (a) Explain the various methods of starting of synchronous motors. (6 marks)

(b) The speed regulations of two 800 kW alternators A and B running in parallel are 100 % to 104 % and 100 % to 105 % from full-load to no load respectively. How will the two alternators share a load of 1000 kW ? What will be the maximum load that can be delivered by both the machines without overloading either of them ? (6 marks)

17. (a) Explain the variation of current during symmetrical short circuit of unloaded alternator. (6 marks)

(b) A 3-phase, 4 pole, 6000 kVA, 5000 V, 50 Hz star connected alternator having a short circuit reactance of 25 % is running on infinite busbars. Calculate the natural time period of oscillation if it has a moment of inertia of 16800 kg.-m.^{2} (6 marks)

Or

18. (a) Explain the effect of varying excitation on armature current and powerfactor of synchronous motor. (6 marks)

(b) A 5000 kVA, 10 kV, 50 Hz, 1500 r.p.m., 3-phase alternator runs in parallel with other machines at full-load, 0.8 pf lagging. Calculate (i) synchronizing power per unit mechanical angle of phase displacement ; (ii) synchronizing torque if the mechanical displacement is 0.5. (6 marks)

19. (a) Explain the different types of excitation systems. (8 marks)

(b) Discuss the principle of operation of Brushless alternator. (4 marks)

Or

20. (a) With sketches, explain the constructional features of Brushless Alternator. (8 marks)

(b) Discuss excitation method in Brushless Alternator. (4 marks)

[5 × 12 = 60 marks]

G 739 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 704—MODERN CONTROL THEORY (EE)

(Improvement—Supplementary)

[2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define observability.
2. Enumerate different types of nonlinearity.
3. When a system is considered as assymptotically stable in the large ?
4. What is pulse transfer function ?
5. What are the applications of PLC ?

(5 × 3 = 15 marks)

Part B

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

6. Obtain the state space model in which observability can be assessed by inspection.
7. Explain the behaviour of nonlinear system.
8. Explain the stability analysis by describing function method.
9. Explain PLC with an illustrative example.
10. Examine stability of the following characteristic equation

$$P(z) = z^4 - 1.2\,z^3 + 0.07z^2 + 0.3z - 0.08.$$

(5 × 5 = 25 marks)

Turn over

Part C

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

11. Explain the design of a full order state observer.

Or

12. Design a state observer to place the poles at –10 and –10 for the system represented as

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \quad Y = [2 \;\; 0] X.$$

13. The following equation is called Van der Pol equation $\ddot{x} - (1 - x^2)\dot{x} + x = 0$, determine the type of singular point. Draw a phase plan potrait.

Or

14. (i) Explain with example the phenomenon of Jump resonance.

(ii) Briefly discuss about state variable feedback. Enumerate the conditions to be fulfilled to apply state feedback.

15. The system is described by the following state equation. Check stability at equilibrium point using quadratic function

$$\dot{X} = \begin{bmatrix} -1 & -2 \\ 1 & -4 \end{bmatrix} X.$$

Or

16. Investigate the stability of the origin of the following system using Lyapunou second method :—

$\dot{x}_1 = x_2$

$\dot{x}_2 = -x_1 - x_2$.

17. Find Z domain transfer function of the following S domain transfer function

(i) $\dfrac{a}{(s+a)^2}$.

(ii) $\dfrac{s}{s^2 + w^2}$.

(iii) $\dfrac{a}{(s+b)^2 + a^2}$.

Or

18. The input-output of a sampled data system is described by the difference equation $c(n+2) + 3c(n+1) + 4c(n) = r(n+1) - r(n)$. Determine Z transfer function. Also obtain the weighting sequence (Discrete impulse response) of the system.

19. Explain principle of operation and architecture of a programmable logic controller.

Or

20. Explain microprocessor based control with suitable example.

(5 × 12 = 60 marks)