F 3640 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 504—ELECTRICAL DRIVES AND CONTROL (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Derive the e.m.f. equation of a DC machine.
2. Define and explain regulation in a transformer.
3. Draw the V-I characteristics of a thyristor for various values of gate current and label the different parameters.
4. List out the different types of choppers.
5. What are the different speed control methods for a DC motor ?

(5 × 3 = 15 marks)

Part B

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

6. Draw the speed torque characteristics of a DC machine and explain with the help of equations.
7. Explain, how equivalent circuit parameters can be obtained by conducting OC and SC tests ?
8. Describe briefly the constructional details of silicon controlled thyristor.
9. Draw the power circuit of a three-phase controlled rectifier and briefly explain the working.
10. Draw the torque speed characteristics of induction motor drive in v/f speed control and explain.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. What are the different types of starters ? Explain with neat figures.

Or

12. (a) Draw the open circuit characteristics of a DC shunt generator and explain. (6 marks)

(b) What are the different losses in a D.C. machine ? (6 marks)

13. Explain with the help of a neat figure, the principle of operation of synchronous motor.

Or

14. What are the different types of single-phase induction motors ? Describe briefly with the help of diagrams.

15. Draw and explain the switching characteristics of IGBT.

Or

16. Compare between R, RC and UJT triggering circuits.

17. Draw the power circuit of a single-phase step up chopper and explain its working with relevant graphs and equations.

Or

18. Explain the working of a three-phase voltage source PWM inverter with 180° mode of operation with appropriate circuits and graphs.

19. Describe the four quadrant operation of chopper fed DC drive with neat figure.

Or

20. With the help of a neat diagram, explain the voltage source inverter fed self-controlled synchronous motor drive.

(5 × 12 = 60 marks)

F 3668 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 506 – MICROPROCESSORS AND APPLICATIONS (EC)

(New Scheme – 2010 Admission onwards)

[Regular / Improvement / Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Write a note on memory mapped I/O.
2. Write a note on stack in 8085.
3. Elaborate on vectored interrupts.
4. Brief the basic principle of working of interfacing devices.
5. Write a note on Minimum mode in 8086.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain the different control signals in 8085.
7. Write an ALP to find the average of numbers in a given array.
8. Explain restart as a software instruction.
9. Explain the internal architecture of 8279.
10. Discuss the advantages and disadvantages of physical memory.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. Explain the architecture of 8085.

Or

12. (i) Draw the timing diagram of MOV A, B and explain.

    (ii) Explain the type and significance of flag registors.

Turn over

13. Explain various types of interrupts in 8085. Discuss ISR and manipulation of interrupts.

Or

14. Explain the interfacing of ADG and DAG to 8085. Discuss the limitations and challenges.

15. (i) Explain how RIM and SIM instruction helps in serial data transfer.

(ii) Write an ALP to generate first 10 prime numbers.

Or

16. Write an ALP to arrange numbers in an array such that odd numbers in ascending order appears first followed by even numbers in descending order.

17. With the help of an internal diagram, explain the working of 8255 A.

Or

18. With the help of a internal diagram, explain the operation of 8259A.

19. Explain the internal architecture of 8086.

Or

20. (i) Explain the concept of logical address and physical address in 8086.

(ii) Explain the interrupt cycle of 8086.

(5 × 12 = 60 marks)

F 3655 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 505—APPLIED ELECTROMAGNETIC THEORY (EC)

(New Scheme—2010 Admission onwards)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Define divergence of a vector field.
2. Explain the concept of displacement current.
3. What are the differences in propagation and general behaviour between TE and TM waves in rectangular wave guides ?
4. Discuss the dominant mode in a circular wave guide.
5. What are r circles and x circles in Smith chart ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain energy density and energy stored in a magnetic field.
7. Explain the wave equation in a conducting medium.
8. Show that TEM mode is absent in wave guides.
9. Discuss the field distribution of TM waves in circular wave guides.
10. Compare open stub matching and short stub matching.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Explain transformation of a vector from Cartesian co-ordinate system to cylindrical co-ordinate system.

(8 marks)

(b) State and explain Stoke's theorem.

(4 marks)

Or

12. (a) Explain boundary relations for static electric fields.

(8 marks)

(b) Find the distance between the points $\left(1, \pi/4, 0\right)$ and $\left(1, 3\pi/4, \pi\right)$ in spherical co-ordinates.

(4 marks)

13. (a) State and explain Poynting theorem.

(8 marks)

(b) Compute phase constant and intrinsic impedance for 1 MHz plane wave in a large block of copper. $\sigma = 5.8 \times 10^7$ sm^{-1} $\epsilon_r = 1$, $\mu_r = 1$.

(4 marks)

Or

14. (a) What is wave polarization ? Explain different types of polarization.

(8 marks)

(b) The conduction current density in a lossy dielectric is given as 0.02 S in 10^9 A/m^2 . Find the displacement current density if $\sigma = 10^3$ mho/m and $\epsilon_r = 6.5$.

(4 marks)

15. (a) Write short notes on :

(a) Wave guide excitation.

(b) Wave guide attenuation.

(2 × 4 = 8 marks)

(b) A rectangular wave guide has dimensions 5 cm × 2.5 cm. Determine phase velocity and phase constant at a wave length of 4.5 cm for dominant mode.

(4 marks)

Or

16. (a) Obtain the field equations for waves in rectangular wave guides.

(8 marks)

(b) Explain the terms, characteristic impedance and surface impedance.

(4 marks)

17. (a) Explain the method of solving field equations in circular wave guides.

(8 marks)

(b) Write a brief note on microwave cavities.

(4 marks)

Or

18. Write short notes on the following :

(a) Circular cavity resonator.

(b) TE waves in circular wave guides.

(c) Q factor of cavity resonator.

(3 × 4 = 12 marks)

19. (a) Obtain the conditions for a lossless transmission line.

(6 marks)

(b) Explain, how a quarter wave line can be used for impedance matching ?

(6 marks)

Or

20. (a) What is SWR in transmission line ? How does stub matching affect SWR in a line ?

(6 marks)

(b) Explain, how standing waves and travelling waves occur in imperfectly matched transmission lines ?

(6 marks)

[5 × 12 = 60 marks]

F 3614 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 502—CONTROL SYSTEMS (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Graph sheets and Semilog sheets are to be supplied.

Part A

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

1. Draw the general block diagram of an open loop canonical control system and an automatic control system.
2. Define stability and differentiate between absolute stability and relative stability.
3. Define compensation techniques in control systems. What are the different methods of compensation ?
4. What is a Nyquist plot ? What is its importance ? How stability can be determined using Nyquist Plot ?
5. Define Eigen values and Eigen vectors and Diagonalization.

(5 × 3 = 15 marks)

Part B

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

6. Why block diagram reduction techniques are necessary in systems ? List down the different block diagram reduction methods ?
7. What is Root Locus Method ? How it can be used for determining stability ? Show any five open loop pole-zero locations and its Root loci.
8. Differentiate dominant poles and insignificant poles of a system. What is the effect of adding poles a zeroes to a system ?
9. List the major frequency domain specification and define them.
10. A state variable formulation of a system is given by the expression :

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

Find the Transfer function of the system.

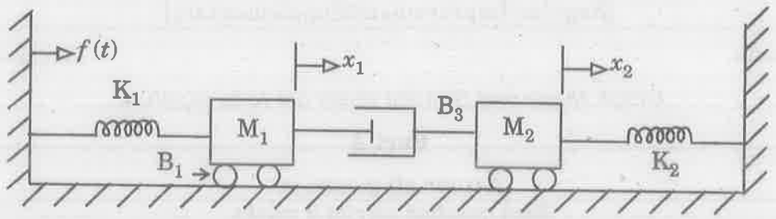
(5 × 5 = 25 marks)

Turn over

Part C

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

11. Obtain the transfer function of translational mechanical system shown in figure below. F (s) is input and x_1 (s) is output.



Or

12. Draw the signal flow graph for the set of linear equations :

$3y_1 + y_2 + 5y_3 = 0$
$y_1 + 2y_2 - 4y_3 = 2$
$-y_2 - y_3 = 0.$

Also obtain the overall transfer function.

13. (i) Determine the Range of 'K' for which the system characteristic equation is :

$s^4 + 20\,ks^3 + 5s^2 + 10s + 15 = 0$ is stable. Use Routh Hurwitz criterion.

(8 marks)

(ii) Establish the relationship between damping ratio and percentage overshoot for a step response of the system.

(4 marks)

Or

14. (i) For a unity Feedback system given by :

$$G(s) = \frac{20(s+2)}{s(s+3)(s+4)}.$$

Find : (a) Static error constants ; (b) Steady state error for input $r(t) = 3\,u(t) + 5t\,u(t)$.

(10 marks)

(ii) What is the concept of generalised error co-efficients ?

(2 marks)

15. The transfer function of a system is :

$$\frac{C}{R} = \frac{k(s+2)}{s^2 + (4+k)s + 2k},$$

where 'k' has constant value. Determine the relationship between value of 'k' and the nature of the system. Use Root Locus method.

Or

16. Draw lag and lead networks and obtain its transfer function. Give the procedure of doing compensation using lag network. When such a compensation is preferred ?

17. Sketch the Bode plot for the following transfer function and determine Gain Margin and Phase Margin

$$G(s) = \frac{75(1+0.2s)}{s(s^2+16s+100)}.$$

Or

18. (i) What are M and N circles ? How closed loop frequency response is determined from open loop frequency using M and N circles ?

(6 marks)

(ii) What is Nichol's Chart ? What are its advantages ?

(3 marks)

(iii) What is the importance of Bode plots ? What is the concept of Corner Frequency in that ?

(3 marks)

19. A system is characterised by the following state space equations :

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & 1\\ -2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix} u\,;\, t > 0$$

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

(i) Find the Transfer function of the system.

(ii) Compute the state transition matrix.

Or

20. Consider the system described by $\dddot{y} + 6\ddot{y} + 11\dot{y} + 6y = 6u$; represent the system in state space form.

[5 × 12 = 60 marks]