F 3467 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

SYSTEM DESIGN WITH MICRO CONTROLLERS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Describe the functions of $\overline{\text{PSEN}}$ and $\overline{\text{EA}}$ pins of 8051.
2. Compare data and program memory of 8051.
3. What happens when DAA instruction is executed ? Explain.
4. Accumulator contains data A3H. What happens when 'RAA' instruction is executed ?
5. What is an interrupt ? List the different types of interrupt ? List the different types of interrupts in 8051.
6. Distinguish between polling and interrupt driven data transfer.
7. List the important specifications of ADC 0808.
8. Sketch a diagram showing interfacing of 8051 with $2k \times 8$ RAM. Explain the interface.
9. Distinguish between EPROM and RAM.
10. List the features of PLC.

(10 × 4 = 40 marks)

Part B

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

11. (a) Sketch the structure associated with any pin on port 1 of 8051.

    (b) List the different modes of timer in 8051.

Or

Turn over

12. (a) Explain the different SFRs in 8051.

    (b) Explain the operation of 8051 timer.

13. (a) List the steps in the sequence when a subroutine is called.

    (b) Explain the different addressing modes in 8051. Give example for each.

Or

14. Write 8051 assembly language program to simulate the action of a 4-bit ring counter. Assume that each of the *four* LED is glowing for 1 second and crystal frequency 12 MHz.

15. (a) Explain how band rate is set for serial data transfer.

    (b) Discuss the priority levels of interrupts.

Or

16. Explain the different types of data transfer schemes in detail.

17. With a detailed block diagram explain how a micro controller can be interfaced with a 4×4 matrix keyboard.

Or

18. Show the diagram and programming sequence for generating sawtooth signal with a micro controller based system.

19. With a block diagram explain a typical DAS. Discuss the practical applications of such system.

Or

20. Explain with necessary diagram for measuring the period of a periodic signal with a micro controller based system.

[5 × 12 = 60 marks]

F 3345 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 703—DRIVES AND CONTROL (EE)

(New Scheme—2010 Admission onwards—Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the functions of power modulators ?
2. Discuss the drawbacks of rectifier fed dc drives.
3. What is meant by constant torque and constant power operation ?
4. Compare VSI and CSI drives.
5. What are the disadvantages of dc traction ?

(5 × 3 = 15 marks)

Part B

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

6. Explain the basic block diagram of an electric drive with functions of each block.
7. Explain the operation of two quadrant chopper fed dc drive.
8. Variable frequency control of an induction motor is more efficient than stator voltage control why.
9. Discuss about the regenerative braking of CSI fed drives.
10. What are the advantages and disadvantages of dc traction using PWM VSI induction motor drives ?

(5 × 5 = 25 marks)

Part C

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

11. What is meant by load equalisation ? Derive an expression for the moment of inertia of the flywheel required for load equalisation.

Or

Turn over

12. With neat circuit diagram and relevant waveforms, explain the operation of a single-phase fully controlled rectifier fed dc separately excited motor in the discontinuous conduction mode.

13. Explain the operation of dual converter fed DC motor drive.

Or

14. A 220 V, 1500 r.p.m., 50 A separately excited motor with armature resistance of 0.5 Ω, is fed from a 3 phase fully controlled rectifier. Available a.c. source has a line voltage of 440 V, 50 Hz. A star-delta connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage. When converter firing angle is zero.

    (i) Calculate transformer turns ratio.

    (ii) Determine the value of firing angle when (a) motor is running at 1200 r.p.m. and rated torque; (b) when running at –800 r.p.m. and twice the rated torque. Assume continuous conduction.

15. Explain voltage source inverter fed induction motor drive with its multiquadrant operation.

Or

16. Discuss the different speed control methods of three phase induction motor.

17. Explain the operation of static Scherbius drive.

Or

18. Explain the operation of induction motor drive under fixed frequency and under variable frequency.

19. (a) Discuss the adjustable frequency operation of synchronous motors. (7 marks)

    (b) What are the important features of traction drives ? (5 marks)

Or

20. Explain self controlled synchronous motor drive employing load commutated thyristor inverter.

[5 × 12 = 60 marks]

F 3366 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 705—COMMUNICATION ENGINEERING (EE)

(New Scheme—2010 Admission onwards—Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Compare AM and FM.
2. What is meant by composite video signal ?
3. What are the applications of pulsed radar ?
4. What is meant by Geostationary orbits ?
5. What is meant by M-Ary modulation ?

(5 × 3 = 15 marks)

Part B

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

6. Explain about ratio detector.
7. Briefly discuss about positive and negative modulation.
8. A low power short range radar is solid state throughout, including a low noise RF amplifier which gives it an overall noise figure of 4.77 dB. If the antenna diameter is 1 m., the IF bandwidth is 500 kHz, the operating frequency is 8 GHz and the radar set is supposed to be capable of detecting targets of 5-m^2 cross-sectional area at a maximum distance of 12 km. What must be the peak transmitted pulse power ?
9. With the help of block schematic, explain the earth station.
10. Determine (a) peak frequency deviation ; (b) minimum bandwidth ; (c) band for a binary FSK signal with a mark frequency of 49 kHz, a space frequency of 51 kHz and an input bit rate of 2 Kbps.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. Explain the working of superheterodyne FM receiver.

Or

12. Explain the working of Armstrong FM modulator.

13. Discuss in detail about the vestigial side band transmission and characteristics of colour transmission.

Or

14. (a) Discuss in detail about the SECAM and PAL transmitter and receivers. (10 marks)

    (b) How is a colour picture tube able to display white ? (2 marks)

15. Discuss in detail about radio navigational aids.

Or

16. Explain in detail about continuous wave radar.

17. With a neat block diagram, explain a satellite communication system. What is the advantage of satellite communication ?

Or

18. Discuss in detail about the TDMA and FDMA.

19. Explain in detail about the BFSK.

Or

20. Explain about M-Ary phase shift keying. Compare M-Ary FSK and M-Ary PSK.

[5 × 12 = 60 marks]

F 3387 (Pages : 2) Reg. No.....

Name.....

EEE

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 706 L02 – INDUSTRIAL INSTRUMENTATION (Elective II) [EE]

(New Scheme – 2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Differentiate between Primary and Secondary transducers citing suitable examples.
2. Define pH. Write its values for acidic and alkaline solutions.
3. List various methods of measurement of liquid level.
4. What are the different types of Pressures and what are the units in which they are measured?
5. Write the principle of expansion thermometer.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Discuss the advantages and disadvantages of capacitive transducers.
7. Describe the construction of Calomel electrode with neat diagram.
8. Give the method of liquid level measurement using float.
9. Describe the method of measurement of differential pressure using an inductive transducer.
10. What are optical transducers? Explain.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Explain the theory of strain gauge and derive the expression for gauge factor.

(12 marks)

Or

Turn over

12. Explain the various methods employed for measurement of speed.

(12 marks)

13. With the help of neat sketches, explain radiation and refractometric densitometers.

(12 marks)

Or

14. Explain rotameter method (two float viscorator) for viscosity measurement with a neat sketch.

(12 marks)

15. (a) Explain any *three* indirect methods of level measurement.

(b) Discuss the significance of servicing level measuring instruments.

(9 + 3 = 12 marks)

Or

16. Write short notes on :

(a) Capacitance level indicator.

(b) Radiation level detectors.

(6 + 6 = 12 marks)

17. (a) With a neat diagram, explain the working of Pirani gauge.

(b) Explain the dynamic pressure measurement using Piezoelectric transducer.

(6 + 6 = 12 marks)

Or

18. (a) Explain the working of a bourdon tube pressure gauge.

(b) Discuss in brief the trouble shooting, repairing and maintenance of pressure measuring instruments.

(6 + 6 = 12 marks)

19. Describe the construction and principle of working of thermocouples. Discuss the thermo-electric laws and their applications.

(12 marks)

Or

20. Write short notes on :

(a) Thermistors.

(b) Calibration of thermometers.

(6 + 6 = 12 marks)

[5 × 12 = 60 marks]

F 3455 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

CONTROL SYSTEMS—II (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Answer **all** *question.*

Part A

Each question carries 4 *marks.*

1. Draw the circuit of a lead compensator and derive it transfer function.
2. Sketch and explain the Bode plots of a lag compensator.
3. Obtain the z-transform of $\sin wt$.
4. Find the inverse z-transform of $\frac{3z^2 + 2z + 1}{z^2 - 3z + 2}$.
5. How do you classify non-linearities ? Explain with examples.
6. What is describing function ? Explain.
7. What do you mean by eigen values and eigen vectors ?
8. Describe any *one* method for finding state transition matrix.
9. Define and explain controllability.
10. Obtain a state model of a system given by :

$$y(k+2) + 5y(k+1) + 6y(k) = u(k).$$

(10 × 4 = 40 marks)

Part B

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

11. Explain the design procedure of lag-lead compensator using frequency domain approach.

(12 marks)

Or

12. Design lead compensator for a system with open loop transfer function $\frac{k}{s^2(s+1.5)}$ to meet the specification :

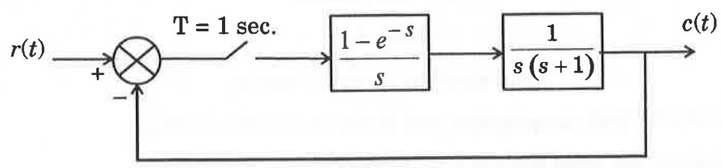
(i) Damping ratio = 0.45.

(ii) Undamped natural frequency = 2.2 rad/sec.

(iii) Velocity error constant 30.

(12 marks)

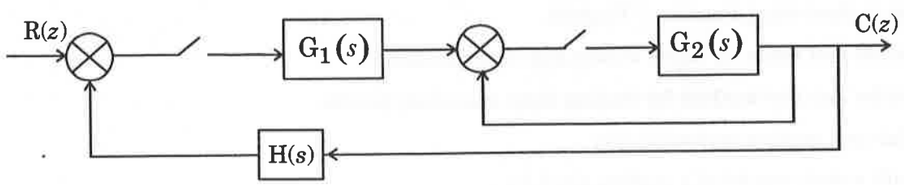
13. For the system shown below find continuous time output $c(t)$. $r(t)$ is a unit step input.



(12 marks)

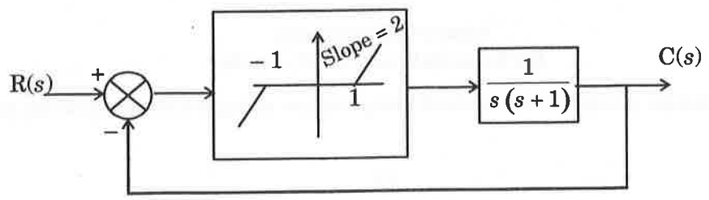
Or

14. Obtain the output $c(z)$ in terms of input and transfer functions of the blocks in the system shown below :



(12 marks)

15. Discuss the stability of the following system



(12 marks)

Or

16. Derive Describing functions of saturation and dead zone linearities. (12 marks)

17. (a) Obtain a state model for the system whose transfer function is $\frac{s^2+6s+8}{(s+3)(s^2+2s+2)}$.

(8 marks)

(b) Prove the non-uniqueness of state models. (4 marks)

Or

18. Find the solution of the system given by :

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

(12 marks)

19. Construct a state model for the system given by :

$\frac{Y(z)}{U(z)} = \frac{z^3+8z^2+17z+8}{(z+1)(z+2)(z+3)}$. Also find state transition matrix.

(12 marks)

Or

20. A system is given by $\frac{Y(s)}{U(s)} = \frac{10}{s(s+1)(s+2)}$. Design a compensator to place the closed loop poles at $-2, -1 \pm j1$.

(12 marks)

[5 × 12 = 60 marks]

F 3435 (Pages : 3) **Reg. No**.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL DRIVES AND CONTROL (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the block diagram of an Electric Drive and write the function of such block. What are the advantages of Electric Drives.
2. What are the various methods of speed control of DC motors ?
3. What is a Dual converter ? Explain with a neat circuit diagram.
4. How chopper fed DC drives are classified ? Explain briefly.
5. What are the applications of stator voltage control of induction motors ? Explain.
6. Describe the principle of V/F control.
7. Compare the characteristics of voltage source and current source inverter.
8. What are the advantages of pwm inverter drives ?
9. Discuss the principle of vector control.
10. What are the various techniques employed for the speed control of synchronous motors ?

(10 × 4 = 40 marks)

Part B

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

11. (a) Draw the circuit diagram and waveforms for a single-phase fully controlled bridge rectifier controlled separately excited d.c. motor.

(5 marks)

(b) A 200 V, 875 r.p.m., 150 A separately excited d.c. motor has an amature resistance of 0.06 Ω. It is fed from a single phase fully controlled rectifier with an a.c. source voltage of 220 V, 50 Hz. Assuming continous conductors, calculate :

Turn over

(i) firing angle for rated motor torque and 750 rpm ;

(ii) motor speed for $\alpha = 160°$ and rated torque.

(7 marks)

Or

12. With circuit diagram and waveforms explain the operator of a single phase Half controlled Rectifier control of d.c. separately excited motor. Draw the speed torque curves for various fring angles. Obtain the expression for speed and torque of the motor for a particular firing angle.

(12 marks)

13. (a) Discuss the principle of Dual = converter control of d.c. separately excited motor. (4 marks)

(b) A 220 V, 1500 rpm, 50A separately excited motor with armature resistance of 0.5 Ω is fed from a circulating current dual converter with a.c. source voltage (line) = 165 V. Determine convertor firing angles for the following operating points : (i) Motoring operators of rated torque and 1000 rpm ; (ii) Braking operation at rated motor torque and 1000 rpm.

(8 marks)

Or

14. (a) Write a note on chopper controlled DC drives. (5 marks)

(b) A 230 V, 960 rpm and 200 A separately excited d.c. motor has an armature resistance of 0.02 Ω. The motor is fed from a chopper which provides both motoring and braking operations. The source voltage is 230 V. Assuming continuous conduction : (i) calculate duty ratio of chopper from motoring operation at rated torque and 350 rpm ; (ii) Calculate duty ratio of chopper for braking operation at rated torque and 350 rpm.

(7 marks)

15. Explain the various speed control technique of 3 phase induction motors. Bring out the advantages, disadvantages and applications of each scheme.

Or

16. (a) Describe with neat diagram the v/f control of 3 phase induction motors. Discuss the constant torque and constant power control.

(8 marks)

(b) Why v/f control is more efficient then slator voltage control ? (4 marks)

17. (a) Describe with neat diagram the operation of an voltage source inverter fed induction motor.

(6 marks)

(b) What is the need for pwm control ? Discuss the features and principle of pwm inverter drive.

(6 marks)

Or

18. (a) Explain the application of current source Inverter to induction motor drives. (5 marks)

(b) Discuss briefly the fixed frequency and visible frequency operation. (7 marks)

19. (a) Discuss the principle of synchronous motor control. (4 marks)

(b) Describe the open loop control of voltage source Inverter fed synchronous motor drive.

(8 marks)

Or

20. Discuss with neat diagram the principle and operation of a self controlled synchronous motor drive using load commutated thyristor inverter.

[5 × 12 = 60 marks]

F 3425 (Pages : 3) **Reg. No**.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—III (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Merchy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Compare the performance of squirrel cage and slip ring induction motor.
2. Explain crawling and how is it eliminated.
3. Suggest methods to increase the starting torque of squirrel cage induction motor.
4. Explain pole changing.
5. Discuss the applications of induction generators.
6. What is the direction of rotation of shaded pole motor ? Can such a motor be reversed ?
7. What is the principle of repulsion motor ?
8. Write a note on hysteresis motor.
9. How does the induction motor operate as frequency converter ?
10. Discuss the principle of linear induction motor.

(10 × 4 = 40 marks)

Part B

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

11. A 3ϕ, 415 V, 30 kW delta connected induction motor gave the following results :—

    No Load Test : 415V, 21A, 1500W

    Blocked rotor Test : 100 V, 45V, 2750 W

    Draw the circle diagram and determine the following :—

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

Turn over

(b) Maximum torque and corresponding slip.

(c) Maximum output and maximum input.

Assume ratio of stator copper loss to rotor copper loss at stand still as 1.2.

(12 marks)

Or

12. (a) Derive the torque equation and explain the torque slip characteristics of three-phase induction motor.

(6 marks)

(b) A three-phase 6 pole induction motor running with 4% slip at full load develops a shaft torque of 150 Nm. The friction and windage losses are 500W and stator copper and iron losses are 1600 W. Calculate the full load efficiency.

(6 marks)

13. (a) Explain star delta starting of induction motor. (6 marks)

(b) Explain single phasing in three-phase induction motor and how is the performance affected by single phasing.

(6 marks)

Or

14. (a) Explain the various methods of speed control of 3-phase induction motor from rotor side.

(6 marks)

(b) The full load slip of 400V, 3ϕ cage induction motor is 4% and full load current is circulated when 90V is applied between hries in the blocked rotor condition. Find the necessary tapping of an autotransformer to limit the starting current to twice the full load current of the motor. Determine the starting torque in terms of the full load torque.

(6 marks)

15. (a) How does the slip ring induction motor operate as synchronous induction motor ? Discuss normal and inverted modes of operation.

(b) Explain the construction and working of split phase motor.

(4 marks)

Or

16. (a) Draw and explain the equivalent circuit of single-phase induction motor. (8 marks)

(b) Explain the operation of different types of induction generators. (4 marks)

17. (a) Explain the construction and operation of universal motor. (8 marks)

(b) Write short note on reluctance motor. (4 marks)

Or

18. (a) Explain the construction and operation of single-phase series motor. (8 marks)

(b) Draw the typical speed torque characteristics of Universal motor for AC and DC supply. (4 marks)

19. (a) Discuss the construction and applications of schrage motor. (8 marks)

(b) Draw and explain the equivalent circuit of Double cage induction motor. (4 marks)

Or

20. (a) With sketches, explain the operation of walker and scherbisus machines. (8 marks)

(b) Draw and explain the torque slip curve of double change induction motor. (4 marks)

[4 × 12 = 60 marks]

F 3356 (Pages : 3) Reg. No. U 9 10

Name. Thomas K. Varghese

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 704—MODERN CONTROL THEORY (EE)

(New Scheme—2010 admission onwards)

[Regular/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Define Controllability.
2. Comment on the stability of limit cycle.
3. Compare describing function analysis with phase plane analysis.
4. Comment on first order hold circuits. What is its transfer function ?
5. State the difference between Microprocessors and Micro controllers.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain the design of a full order observer.
7. Define singular points. How is it classified ?
8. State Popov's criterion.
9. Explain stability using Schurcohn method.
10. What is a programmable logic controller ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Design a state feedback controller to place the poles at –10, –10 for the system represented as :

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \quad Y = [2 \quad 0] \begin{bmatrix} x_i \\ x_2 \end{bmatrix}.$$

Or

12. Consider a system $\dot{X} = AX + Bu \quad Y = CX$ where $A = \begin{bmatrix} 0 & 20.6 \\ 1 & 0 \end{bmatrix} B = \begin{bmatrix} 0 \\ 1 \end{bmatrix} C = [0 \quad 1]$. Design a full order observer. Desired eigen values of observer matrix are $\mu_1 = -1.8 + j\,2.4, \mu_2 = -1.8 - j\,2.4$.

13. A linear second order servo is described by the equation $\ddot{Y} + 2\xi w_n \dot{Y} + w_n^2 Y - w_n^2$ where $\xi = 0.15$, $w_n = 1 \text{rad/sec}\, Y(0) = 1.5, \dot{Y}(0) = 0$. Determine singular points. Construct phase trajectory using method of isoclines.

Or

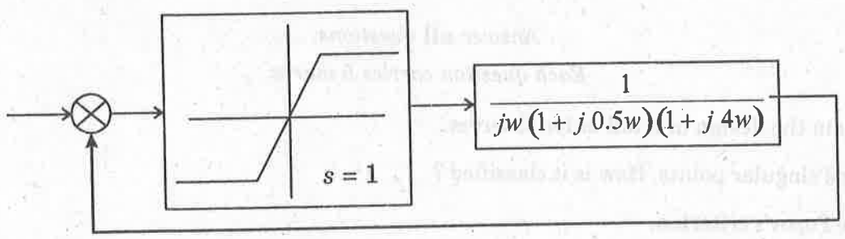
14. Obtain the phase plane portrait of the non-linear system given as :

$$\ddot{X} + |\dot{X}| + X = 0.$$

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

Or

16. Consider a unity feedback system having a saturation non-linearity with gain K. Determine the maximum value of K for the system to stay stable.



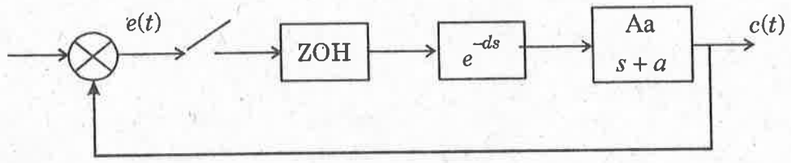
17. (a) Solve the inverse z-transform of $\frac{4z^2 - 2z}{z^3 - 5x^2 + 8z - 4}$.

(b) Solve the difference equation :

$$x(k+2) - 3x(k+1) + 2x(k) = 4^k \; x(0) = 0 \quad x(1) = 1.$$

Or

18. Sampled data control system of order one with transportation log is shown in figure. Determine the condition for system stability if $\delta < T$.



19. Explain different control hirarchies for plant level automation.

Or

20. Explain DSP based control with suitable example.

(5 × 12 = 60 marks)

F 3321

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

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 701—ELECTRICAL POWER TRANSMISSION (EE)

(New Scheme—Regular / Supplementary)

[2010 admission onwards]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What do you mean by transposition of long transmission lines ? What is its importance in transmission system ?
2. What is tuned power lines ?
3. What is string efficiency ? Give its importance.
4. What is effective grounding process ?
5. Write the advantages of HVDC transmission system.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Derive the equation for inductance of a 2-wire line.
7. Derive the ABCD constants for medium lines using nominal T method.
8. Derive the equation for capacitance in single core cables.
9. What are the factors affecting corona ?
10. Explain different types DC links.

(5 × 5 = 25 marks)

Turn over

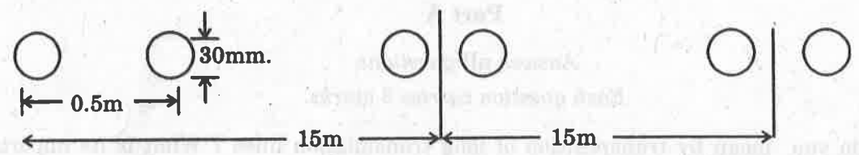
Part C

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

11. Derive the equation for inductance in composite conductors.

Or

12. A 500 KV line has a bundling arrangement of two conductors/phase as shown in figure below. Compute the reactance/phase of this line at 50 Hz. Each conductor carries 50% of the phase current . Assume full transposition.



13. Derive the ABCD constants for long transmission lines vigorous solution is required.

Or

14. A 3ϕ 50 Hz transmission line is 400 km long. The voltage at the sending end is 220 kV. The line parameters $r = 0.125\ \Omega/\text{km}$, $x = 0.4\ \Omega/\text{km}$ and $y = 2.8 \times 10^{-6}\ \text{℧}/\text{km}$. Find :

    (i) The sending end current and receiving end voltage when there is no-load on the line.

    (ii) The maximum permissible line length if the receiving end no-load voltage is not to exceed 235 kV.

    (iii) For part (i) the maximum permissible line frequency, if the no-load voltage is not to exceed 250 kV.

15. Explain different types of insulators. Explain the reasons for failure of insulators.

Or

16. Explain two methods for location of faults in UG cables.

17. Explain different grounding methods.

Or

18. A 3-phase 220 kV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 m apart in equilateral triangular formation. If the temperature is 40°C and atmospheric pressure is 76 cm. Calculate the corona loss/km of the line. Take $m_0 = 0.85$.

19. Explain the different interconnection methods of HVDC into AC system. Mention its advantages and disadvantages.

Or

20. Explain (a) SVC ; (b) TCR ; (c) UPFC.

(5 × 12 = 60 marks)

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Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 702—SYNCHRONOUS MACHINES (EE)

(New Scheme—2010 Admission onwards—Regular/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Mention the advantages of stationary armature.
2. Give the reason for obtaining high value of voltage regulation in EMF method.
3. Why synchronous motor is not self starting ?
4. What is synchronous condenser ?
5. What is exciter response ?

(5 × 3 = 15 marks)

Part B

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

6. Define distribution factor and derive an expression for the same.
7. When the load on the alternator is varied, how the terminal voltage is changed ?
8. Derive the synchronising torque equation.
9. Explain power angle characteristics of synchronous generator.
10. Discuss the requirements of excitation system and what is exciter ceiling voltage.

(5 × 5 = 25 marks)

Part C

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

11. (a) Explain different types of armature windings in alternators. (8 marks)

(b) A 3-phase, 16 pole alternator has star connected armature winding with 144 slots and 10 conductors/slot. The flux per pole is 0.035 Wb sinusoidally distributed and the speed is 375 r.p.m. Find the line e.m.f. generated assuming full pitched coils. (4 marks)

Or

12. (a) A 3-phase, 50 Hz, 10 pole star connected alternator has 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150°. The flux per pole has fundamental component of 0.12 Wb and 20 % third harmonic component. Find line emf generated. (8 marks)

(b) Compare salient pole and non salient pole types of rotor construction. (4 marks)

13. (a) Draw and explain phasor diagram of salient pole alternator on the basis of two reaction theory. (8 marks)

(b) A 3-phase, 50 Hz, 100 kVA, 3000 V star connected alternator has armature resistance of 0.3 Ω/phase. A field current of 40 A produces short circuit current of 200 A and a line emf of 1050 V on open circuit. Calculate the full-load voltage regulation at 0.8 pf leading. (4 marks)

Or

14. (a) Explain the method of predetermining voltage regulation by ZPF method. (8 marks)

(b) A 3-phase, star connected alternator supplies a current of 10 A at a phase angle of 20° at 400 V. The direct axis and quadrature axis reactances per phase are 10 Ω and 0.5 Ω. Find the components of armature current and voltage regulation neglecting armature resistance. (4 marks)

15. (a) Explain the synchronizing of alternators using synchronizing lamps. (6 marks)

(b) A 440 V, 50 Hz, 3 phase circuit 30 A at 0.8 pf lag. A star connected synchronous motor is used to improve the power factor to unity. Calculate the kVA input and the pf of the synchronous motor when it is also supplying a load of 10 kW and has an efficiency of 85 %. (6 marks)

Or

16. (a) Explain Hunting in synchronous motor and how is it prevented. (6 marks)

(b) Two similar 20 MW alternators operate in parallel. The speed load characteristics of the driving turbines are such that frequency of first alternator drops from 50 Hz on no load to 48 Hz on full load and that of second alternator drops from 50 Hz to 48.5 Hz. How will the two alternators share a load of 30 MW ? (6 marks)

17. Write short notes on the following :—

(i) Steady-state stability limit. (4 marks)

(ii) O curves. (4 marks)

(iii) Power angle characteristics. (4 marks)

Or

18. (a) Draw the circuit model of alternator during steady-state, transient and subtransient states. Discuss how the reactances during these states affect the machine performance. (6 marks)

(b) A 3-phase, star connected synchronous motor takes 48 kW at 693 V, the pf bung 0.8 lag. The induced emf is increased by 30 %, the power taken remaining the same. Find the new current and p.f. The machine has synchronous reactance of 2Ω/phase and negligible resistance. (6 marks)

19. Explain and compare the various types of excitation systems.

Or

20. Explain the constructional details and principle of operation of Brushless alternator.

[5 × 12 = 60 marks]