G 1367 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

BIOMEDICAL INSTRUMENTATION (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. Mention the effects of artifacts in ECG recording.
2. Define the terms :
   (a) Tidal volume.
   (b) Expiratory reserve volume.
   (c) Inspiratory volume.
   (d) Total lung capacity.
3. Discuss the function of ventilators.
4. Explain the principle of magnetic resonance imaging.
5. What is photoplethesmography ?
6. List the different types of surface electrodes.
7. What are the methods involved in blood pressure measurement ?
8. Name the parameters that dictate transducer capability.
9. Describe the electrical activity of the cell.
10. Define galvanic skin resistance.

(10 × 4 = 40 marks)

Part B

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

11. (a) Explain the theory of electrode-skin interface. (8 marks)
    (b) Distinguish between polarizable and non-polarizable electrodes. (4 marks)

Or

12. Explain the different types of biopotential transducers with examples.

Turn over

13. Enumerate the electrophysiology of the heart.

Or

14. Explain the working of a spirometer. What are their applications ? Also draw a typical spirogram.

15. What is a defibrillator ? Draw the DC defibrilaltor circuit with discharge waveform.

Or

16. Give the relationship between resistance change and temperature change of a thermistor. Explain.

17. (a) Explain the physiological effects due to electric currents. (6 marks)

(b) Explain in detail the electrical safety codes and standards for electromedical equipments. (6 marks)

Or

18. Explain the basic principle of operation of computed tomography with a neat diagram.

19. Write short notes on :

(i) Shock hazards from electrical equipment.

(ii) Direct electrical contact to the heart.

Or

20. Write short notes on Computerized axial tomography scanners.

(5 × 12 = 60 marks)

G 1106 ✓ (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

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

(New Scheme – 2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Classify transducers giving examples
2. What are the applications of Viscometers?
3. Illustrate Microwave level switches.
4. Mention about elastic pressure transducers
5. What is LDR?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Write short note about LVDT.
7. Various importance of pH measurement.
8. Illustrate float type level indicator.
9. Explain measurement of vacuum with diagram.
10. Describe various methods of measuring temperature.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Explain any *two* method of torque measurement.

Or

12. Describe the following with diagrams :
    (a) Eddy current tachometer.
    (b) Electric generator type tachometer.
13. Discuss density measurement by magnetic method and vibration method.

Or

14. Explain in detail the construction and working pH electrode with neat sketch.
15. Write down four different direct methods of level measurements with necessary diagrams.

Or

16. Discuss the following level indicators with diagram :
    (a) Capacitance level.
    (b) Radioactive method.
    (c) Laser level sensors.
17. Describe Bourdon gauge with neat diagram. Mention its features.

Or

18. Write short notes on :
    (a) Mc Leod gauge with diagram.
    (b) Ring balance gauge with diagram.
19. Explain pyrometers with relevant diagrams.

Or

20. Different types of electrical temperature measurement devices.

(5 × 12 = 60 marks)

G 1105 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 706 L01 – HV DC TRANSMISSION (Elective II) [EE]

(New Scheme – 2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Define breakeven distance. Sketch the characteristics showing variation of costs with the line length.
2. What are the major drawbacks of individual phase control?
3. Mention the application of DC breakers.
4. Mention the various reactive power sources to the converter.
5. With a neat sketch, explain the voltage limit control adopted in the MTDC system.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Mention the disadvantages of DC transmission. How to overcome the disadvantages of DC transmission?
7. Explain constant alpha control with neat diagram.
8. With a neat sketch, explain the protection against over current in converter station.
9. Differentiate between the SVC and STATCOM.
10. With a neat sketch, explain the decentralized current reference balancing for MTDC system.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Compare AC and DC transmission on the basis of economics, technical performance and reliability.

(12 marks)

Or

12. Draw the Schematic diagram of a typical HVDC converter station and explain each component.

(12 marks)

13. Explain the principle of DC link control with a steady state equivalent circuit of a 2 terminal DC link.

(12 marks)

Or

14. Explain the process of energization and deenergization of a converter bridge with isolator.

(12 marks)

15. With a neat waveforms, explain midpoint and terminal transient over voltage in the DC line.

(12 marks)

Or

16. What are the different types of fault that can occur in HVDC System? Discuss their nature and occurrence.

(12 marks)

17. Explain the criteria of designing an AC filter.

(12 marks)

Or

18. (a) Explain the reactive power control during transients.

(b) Write short notes on the following :–

(i) Telephone influence factor.

(ii) Harmonic distortion.

(6 + 6 = 12 marks)

19. (a) Explain the various potential application of MTDC system.

(b) Explain the various multi-terminal DC systems.

(6 + 6 = 12 marks)

Or

20. Explain the modelling of DC and AC network using state equations.

(12 marks)

[5 × 12 = 60 marks]

G 1083 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 705—COMMUNICATION ENGINEERING (EE)

(New Scheme—2010 Admission Onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Determine the peak frequency deviation and modulation index for an FM modulator with a deviation sensitivity of 5 kHz/V and a modulating signal of peak amplitude 2 volts and frequency 2000 Hz.
2. Calculate the minimum receivable signal in a radar receiver which has an IP bandwidth of 1.5 MHz and a 9-dB noise figure.
3. Define the principles of differential PCM system.
4. For an 8-PSK system, operating with an information bit rate of 24 kbps, determine baud, minimum bandwidth and bandwidth efficiency.
5. For an earth station transmitter with an antenna output power of 10000 Watts, a back-off loss of 3-dB, a total branching and feeder loss of 3-dB, and a transmit antenna gain of 40 dB, determine the EIRP.

(5 × 3 = 15 marks)

Part B

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

6. Compare Amplitude modulation and Angle modulation.
7. Define the terms; luminance, hue and saturation. Also explain the relation between them.
8. State and briefly explain Kepler's laws.
9. For the binary data 11001101, draw the ASK, FSK and PSK waveforms.
10. In a satellite of bandwidth 500 MHz, how many transponders of 36 MHz can be accommodated? Assume a guard band of ± 2 MHz. Draw a schematic/spectrum indicating the bandwidth occupied by each transponder if the uplink spectrum is 6525 MHz–7025 MHz.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. With the block diagram of an AM super heterodyne receiver with simple AGC, explain the functions of each block of a AM receiver. (12 marks)

Or

12. (a) Describe the working of FM reactance modulator with a schematic diagram. (6 marks)

(b) Explain the operation of a Ratio detector with a schematic diagram and voltage-versus-frequency response curve. (6 marks)

13. Draw the composite TV video waveform labelling all the pulses. Explain the functions of sync pulses, pre-equalizing pulses, serration and post equalizing pulses. (12 marks)

Or

14. With the aid of a block diagram, explain the operation of colour TV transmitter. (12 marks)

15. (a) What are the basic functions of radar ? Draw a functional block diagram of a pulsed radar set, and describe the functions of each block. (8 marks)

(b) Briefly explain the applications of Radar. (4 marks)

Or

16. Explain the working of continuous wave radar and MTI radar with the aid of block diagrams. Mention their applications.

(12 marks)

17. With relevant block diagrams, explain the working of the three basic sections of a satellite system.

(12 marks)

Or

18. (a) With a block diagram, explain the operation of a SPADE earth station transmitter.

(6 marks)

(b) Explain the principle of a CDMA system. (6 marks)

19. (a) Explain the working of a delta modulation system. (6 marks)

(b) For a PCM system with the following parameters, determine minimum sampling rate, minimum number of bits used in the PCM code, resolution, quantization error and coding efficiency :

Maximum analog input frequency	=	4 kHz
Maximum decoded voltage at the receiver	=	± 2.55 volts
Minimum dynamic range	=	46 dB.

(6 marks)

Or

20. Describe the working of QPSK modulator and demodulator with block diagrams, mathematical expressions, waveforms and constellation diagram

(12 marks)

[5 × 12 = 60 marks]

G 1073 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 704 – MODERN CONTROL THEORY (EE)

(New Scheme – 2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What is compensation technique? and when we use lead compensation technique.
2. What is Popov's criterion? Explain in brief.
3. Write a note on Dead zone non-linearity.
4. What is observability? Explain with an example.
5. Write short on Direct Digital Control.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain the concept of controllability with an example.
7. What are common physical non-linearities. Give examples along with an explanation in brief.
8. Explain along with mathematical equation of Lyapnov method of non-linearity.
9. What is state transition matrix? What are its properties?
10. What is pole placement compensation? Explain in brief.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. What is an observer? What are its needs? Explain the properties and structure of a full order observer.

Or

Turn over

12. The state equation and output equation of system is given by :

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \\ \dot{X}_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ -2 & -3 & 0 \\ 0 & 2 & -3 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} [u]$$

$$y = [1\,0\,0] \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix}$$

Find the controllability and observability of a system.

13. A linear second order servo is described by the equation :

$$\ddot{e} + 2\{ w_n e' + w_n^2 c = 0$$

Where { = 0.15, w_n = 1 rad/sec, e (0) = 1.5 and $\dot{e}$ (0) = 0.

Determine the singular point. Construct the phase trajectory using the method of isoclines.

Or

14. Construct a phase trajectory by delta method for a non-linear system represented by the differential equation :

$$\ddot{X} + 4 \left|\dot{X}\right| \dot{X} + 4X = 0.$$

Choose the initial conditions as $X(0)$ 1.0 *and* $\ddot{X}$ (0) = 0.

15. Derive the describing function equation of the non-linearity having saturation non-linearity.

Or

16. Explain the behaviour of non-linear systems.

17. Find the one sided Z-Transform of the sequences generated by mathematically sampling the following time functions :

(a) t^2 ; (b) Sincot.

Or

18. Check for stability of the sampled data control system of the characteristic equation :

$Z^4 - 1.7\,Z^3 + 1.04\,Z^2 - 0.268\,Z + 0.024 = 0$ by using Jary's stability test method.

19. State the different PLC programming languages with example.

Or

20. State the different control hierarchies for plant level automation.

(5 × 12 = 60 marks)

G 1062 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 703—DRIVES AND CONTROL (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the different parts of electrical drives ? Draw the block diagram.
2. Discuss on the four quadrant operation of chopper-fed drives briefly.
3. Explain the principle of V/f control.
4. How the dynamic braking is different from regenerative braking ? Discuss.
5. Discuss on any *two* important features of fraction DC drives.

(5 × 3 = 15 marks)

Part B

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

6. Mention the four quadrant modes of operation of a hoist and draw the four quadrant diagram of speed torque characteristics.
7. Discuss on regenerative braking of chopper-fed drives.
8. Explain briefly the principle of stator voltage control of 3-phase induction motor.
9. Discuss on basic principle of vector control.
10. Discuss on conventional AC drives for electric traction.

(5 × 5 = 25 marks)

Part C

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

11. With relevant diagrams, explain the inverter and motoring modes of operation of half controlled bridge rectifier drive.

Or

Turn over

12. Write a note on components of load torques. Explain the working of fully controlled bridge rectifier drive in continuous conduction mode.

13. Explain the single, two and four quadrant operation of chopper-fed drives.

Or

14. Explain the working of dual converter-fed DC motor drives.

    Illustrate with waveforms the inverter mode operation of bridge rectifier drive.

15. With relevant diagrams, explain the VSI based induction motor drives. Draw the waveforms to illustrate V/f control.

Or

16. Explain the controller configurations of stator voltage control of three-phase induction motor. Illustrate graphically the constant torque and constant power operation.

17. What do you understand by slip speed control of 3-phase induction motor ? Explain principle of slip power recovery scheme.

Or

18. Explain the regenerative braking of VSI-fed drives and explain the basic principle of vector control.

19. Explain the self controlled synchronous motor drive using load commutated thyristor inverter, with neat diagrams.

Or

20. Discuss on important features of fraction drives. Write a note on PWM VSI SCIM drives.

(5 × 12 = 60 marks)

G 1050 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 702—SYNCHRONOUS MACHINES (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define distribution factor and coil span factor.
2. Explain armature reaction of a synchronous machine.
3. Define synchronization of an alternator and mention the condition for synchronization.
4. Explain with a diagram damper winding.
5. Draw a phasor diagram of a synchronous machine.

(5 × 3 = 15 marks)

Part B

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

6. Calculate the r.m.s. value of the induced e.m.f. per phase of 10-pole, 3ϕ, 50 Hz alternator with 2 slots per phase per pole and 4 conductors per slot in two layers. The coil span is 150°. The flux per pole of 0.12 μs.
7. Explain any *one* method of synchronization of alternator.
8. Explain the methods of increasing the response of an excitor.
9. Explain briefly transient and sustransient reactance current variation during short-circuit.
10. Explain starting of synchronous motors.

(5 × 5 = 25 marks)

Part C

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

11. With neat sketches, explain constructional details of salient and non-salient pole alternators.

Or

Turn over

12. (a) Derive an expression for distribution factor and coil span factor. (6 marks)

(b) Explain briefly revolving magnetic field. (6 marks)

13. (a) Explain the two reaction theory of salient pole synchronous machine. (6 marks)

(b) Define voltage regulation of an alternator. Explain MMF method of determining regulation of alternator. (6 marks)

Or

14. (a) Describe the slip test method for the measurements of X_d and X_q of synchronous machines. (6 marks)

(b) Find the regulation by the zero-power factor method of 5000 kVA, 6600 V, 3-phase, 50 Hz, star-connected alternator at full-load, UPF having the following test data :—

Field current in amps.	:	32	50	75	100	140
Open-circuit terminal voltage in volts	:	3100	4900	6600	7500	8300
Full-load current zero pf tests line Pd in volts	:	0	1850	4250	5800	7000

Neglect armature resistance. (6 marks)

15. (a) Explain methods of starting of synchronous motors. (6 marks)

(b) Explain Hunting in synchronous machine and with a neat sketch, explain damper winding. (6 marks)

Or

16. (a) With a neat sketch, explain principles of operation of synchronous motors. (6 marks)

(b) Explain different torques of a synchronous motor. (6 marks)

17. (a) Explain V and inverted V curves. (6 marks)

(b) With a neat sketch, explain synchronous condensor. (6 marks)

Or

18. (a) Explain symmetrical short-circuit of unloaded alternator. (8 marks)

(b) Explain briefly steady-state reactance. (4 marks)

19. (a) Explain different types of exciter ceiling voltage. (6 marks)

(b) Explain the method of increasing the response of an exciter. (6 marks)

Or

20. (a) Explain with a diagram principle of operation of brushless alternators. (6 marks)

(b) Explain different methods of excitation of brushless alternators. (6 marks)

[5 × 12 = 60 marks]

G 1038 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 701—ELECTRICAL POWER TRANSMISSION (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the advantages of using bundled conductors ?
2. Explain the reactive power generation of a line.
3. Mention the factors affecting a mechanical design of overhead transmission lines.
4. Explain different types of substations.
5. Mention various application of HVDC.

(5 × 3 = 15 marks)

Part B

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

6. A single-phase 10 km line is 8m above the ground. The diameter of the conductor is 2 cm and is separated by 4 m horizontally. Find capacitance between the conductors and capacitance between phase and neutral.
7. Derive an expression for a power flow in a long transmission line.
8. With a neat diagram, describe murray loop test for the location of faults in the underground cables.
9. Explain the various factors affecting corona loss.
10. Mention the advantages of HVDC transmission over HVAC transmission.

(5 × 5 = 25 marks)

Part C

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

11. What is an inductance per loop length ? Derive the inductance per conductor in a single-phase two wire system.

Or

12. Derive the expression for the capacitance of 3-phase line with asymmetrical spacing. (12 marks)

Turn over

13. Derive the expression for receiving and sending end power flow through a transmission line.

(12 marks)

Or

14. What do you mean by compensation of transmission line ? Explain different types of compensation in the transmission line.

(12 marks)

15. Define string efficiency. Explain the various methods to improve the string efficiency.

(12 marks)

Or

16. An ACSR conductor has the following data : normal copper area = 120 mm^2, size = (30 + 7) / 6.30 mm, weight = 0.4 kg/m, tensile strength = 1250 kg, safety factor = 5. If span length is 200 m. find

(a) Sag in still air ;

(b) Sag, if the conductor is covered with 0.5 cm thick ice (ice density of 915 kg/m^3) ;

(c) Sag (total and vertical), if the conductor is covered with ice 0.5 cm thickness and a wind pressure of 10 kg/m^2 is acting on the projected area.

(12 marks)

17. Explain :

1 Solid grounding ;

2 Resistance grounding ;

3 Reactance grounding.

(12 marks)

Or

18. (a) With a neat sketch explain the earthing of transformer. (6 marks)

(b) A 3-phase transmission line is having three conductors equilaterally spaced 6 m apart. The diameter of each conductor is 2cm. The air temperature is 27° C and pressure is 72 cm of Hg. If the surface factor is 0.82 and irregularity factor is 0.90, find the critical disruptive and visual critical disruptive voltages.

(6 marks)

19. With a neat sketch explain the different types of HVDC links. Why the bipolar line more commonly used.

(12 marks)

Or

20. Explain :

(a) Static synchronous compensator ; (b) Static Var compensator ;

(c) Thyristor controlled series reactor ; (d) Unified power flow controller.

(12 marks)

[5 × 12 = 60 marks]