G 1859 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 601—POWER GENERATION AND DISTRIBUTION (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 the role of an alternator ?
2. Discuss power factor tariff.
3. What is the significance of distribution ?
4. Define and explain : power factor.
5. What are the challenges in energy audit ?

(5 × 3 = 15 marks)

Part B

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

6. Write a note on classification of hydro plants.
7. Briefly discuss the economics of power factor correction.
8. How will the voltage drop vary with load variation ?
9. Define load density. Write the steps in voltage drop computation.
10. Discuss any *three* applications of energy management.

(5 × 5 = 25 marks)

Part C

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

11. Explain the working of a hydroturbine. Explain the classification of hydroturbines and the criteria.

Or

12. Discuss all the parts of a diesel power plant. Explain the energy balance and thermal cycles.

Turn over

13. Explain the following :

    (i) Two part tariff. (4 marks)

    (ii) Flat rate tariff. (4 marks)

    (iii) Block rate tariff. (4 marks)

Or

14. Describe the different economic aspects of power generation and distribution. Define and explain diversity factor.

15. With a neat sketch, explain the loading on a feeder line. How will you vary the loadings ? Discuss in detail.

Or

16. What is a ring distribution system ? How will you choose a distribution system ? Explain all the calculations to achieve efficient distribution.

17. Discuss, in detail the voltage drop in (i) AC single-phase 2 wire system ; and (ii) AC three-phase 3 wire and 4 wire systems.

Or

18. Discuss all the techniques for power loss estimation in distribution systems.

19. Explain the maximum demand control and electrical load management.

Or

20. Explain the tools, methods and the types of energy audit. Draw and explain, each using a block diagram.

[5 × 12 = 60 marks]

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

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 602—INDUCTION MACHINES (EE)

(New Scheme—2010 Admission onwards)

[Improvement / Supplementary]

Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

Explain the various types of rotor construction in 3-phase induction motors.

Give three applications of induction machines.

Draw phasor diagram of induction generator.

Explain the working of universal motors.

Explain the construction of stepper motors.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

Write notes on :

(i) Cogging.

(ii) Crawling.

Explain various starting methods of induction motors.

Explain various types of single phase induction motors.

Explain the working principle of commutator motors.

Discuss in detail about the principle and applications of linear induction motors.

(5 × 5 = 25 marks)

Part C

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

11. Explain the procedure for deriving the equivalent circuit of a 3-phase induction motor.

Or

12. A 400 V, three-phase induction motor is provided with the following data :

No-load test	:	400 V	3.5 A	650 W
Blocked rotor test	:	200 V	12.5 A	1700 W

The friction and windage losses are 185 W.

Determine :

(a) The resistance equivalent to iron loss.

(b) The magnetizing component of reactance.

Consider the stator winding to be delta connected.

13. Explain all speed control methods of induction motors.

Or

14. A 3-phase squirrel cage induction motor has a short-circuit current equal to 4 times the rated full-load current. Determine the starting torque as a percentage of the full-load torque if the motor is started by : (a) a star-delta starter, (b) direct switching to the supply, (c) an autotransformer starter with starting current from supply being limited to 2 times the full-load current. Assume the rated full-load slip is 5%.

15. Explain the construction and working of Synchronous Induction Motors.

Or

16. Using Revolving Field Theory, explain why single phase induction motors are not self-starting.

17. Explain in detail about single phase series motor

Or

18. Differentiate between the working principles of Repulsion and Reluctance motors.

19. Explain the construction, principle of operation and operating characteristics of Permanent Magnet Synchronous Motors.

Or

20. Explain the construction, principle of operation and operating characteristics of Switched Reluctance Motors.

(5 × 12 = 60 marks)

G 1883 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 603—CONTROL SYSTEMS (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Graph sheets and Semilog sheets can be provided.

Part A

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

1. Define generalised error series. How they are different from static error coefficients ?
2. Explain the terms gain margin and phase margin as applied to the stability of a control system.
3. What is a PID controller ?
4. What is eigen value ? Write its properties.
5. What are the elements used in a discreté control system ?

(5 × 3 = 15 marks)

Part B

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

6. How transporation lag is analysed using frequency response ? How these systems are classified ?
7. Describe how the phase margin and gain margin can be obtained from the polar plot.
8. Draw the circuit diagram of a lead compensator. Sketch its polar plot and Bode plots.
9. Give the criteria for controllability and observability.
10. A discrete time system has the characteristic equation $p(z) = z^3 - 1.1z^2 - 0.1z + 0.2 = 0$. Show that the system is critically stable.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. Sketch the Bode plots for the transfer function $G(s) = \frac{Ke^{-0.1s}}{s(1+s)(1+0.1s)}$ and determine K for the gain cross-over frequency w_c to be 5 rad/sec.

Or

12. Draw the Bode plot and find the value of K that results in $\xi = 0.707$ and $t_s \leq 4$ sec. for the open lop transfer function $G(s) = \frac{K(s+4)}{(s-1)(s+2)}$. Find the peak overshoot, settling time and the position error coefficient using the same K.

13. By the use of Nyquist criterion, determine whether the closed loop system having the following open loop transfer function is stable or not :

$$G(s) = \frac{180}{(s+1)(s+2)(s+5)}.$$

Draw the Nyquist plot.

Or

14. Sketch the polar plot of $G(s) = \frac{1}{s(1+s)(1+2s)}$ and find the phase margin and gain margin. Comment on the stability of the system.

15. The forward transfer function of a unity feedback system is $\frac{K}{s(s+2)(s+10)}$. The system is to satisfy the following specifications :

    (i) % overshoot ≤ 16 % for unit step input.

    (ii) Steady-state error for unit ramp input $\leq \frac{2}{15}$ rad/sec. Design a suitable lag network using root locus technique.

Or

16. Design a cascade compensation for a system whose transfer function is $G(s) = \frac{K}{s(1+0.1s)(1+0.001s)}$. It will fulfil the following specifications :

    (i) Phase margin ≥ 45°.

    (ii) Velocity constant K_v = 1000/sec.

17. Consider the system given by :

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix}=\begin{bmatrix}2 & 0 & 0\\ 0 & 2 & 0\\ 0 & 3 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}+\begin{bmatrix}0 & 1\\ 1 & 0\\ 0 & 1\end{bmatrix}\begin{bmatrix}u_1\\ u_2\end{bmatrix}=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}.$$

Is the system completely state controllable and completely observable ?

Or

18. Derive the state models for the system described by $D^3y + 4D^2y + 5Dy + 2y = 2D^2u + 6Du + 5u$ in

(i) Phase variable form ; and

(ii) Jordan canonical form.

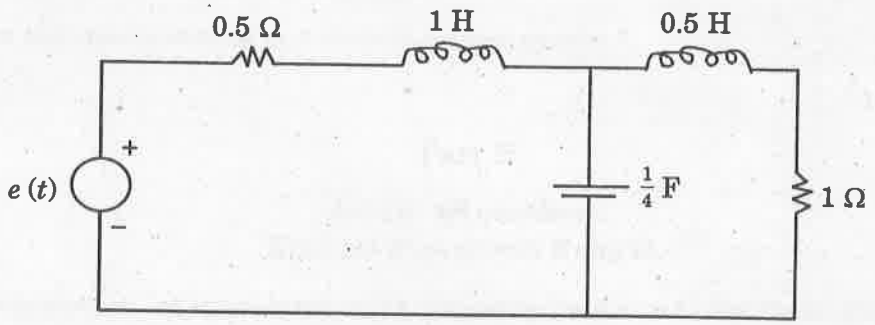
Also draw the simulation diagram in each case.

19. Obtain the discrete time state space representation of the following continuous time system :

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}0 & 1\\ 0 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}u(t).$$

Or

20. Obtain the state model for the electrical network shown below, treating the voltage across 1 ohm resistor as the output variable. Also derive the transfer function of the system starting from the state model :



(5 × 12 = 60 marks)

G 1897 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 604—DIGITAL SIGNAL PROCESSING (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 whether the system $y(n) = \cosh [nx(n) + x(n-1)]$ is linear or not.
2. Find IDFT of $Y(k) = \{1, 0, 1, 0\}$.
3. Explain the characteristics of bilinear transformation.
4. What is a window ? List the desirable characteristics of the window.
5. Explain fixed point and floating point representation of binary numbers ?

(5 × 3 = 15 marks)

Part B

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

6. Determine the inverse z-transform of

$$X(z) = \frac{(z^2 - 3z)}{\left(z^2 - \frac{3}{2}z - 1\right)}; \quad \frac{1}{2} < |z| < 2.$$

7. Find the circular convolution of $x_1(n) = \{1, 2, 3, 1\}$ and $x_2(n) = \{4, 3, 2, 2\}$.
8. What is meant by pre-warping ? Why it is employed ?
9. Realise the FIR system $H(z) = 1 + 3z^{-1} + 2z^{-2}$ in lattice structure.
10. With a neat diagram, explain the working of the ALU of TMS 320C54XX.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Solve the differential equation $\frac{d^2y}{dt^2}(t)+5\frac{dy}{dt}(t)+4y(t)=\frac{dx(t)}{dt}$, given $y(0) = 0$, $\frac{dx(t)}{dt}\Big/_{t=0}=1$, $x(t)=e^{-2t}u(t)$. (8 marks)

(b) Find the Fourier transform of the rect function which is **unity** over the interval from – 0.5 to + 0.5 and zero elsewhere. (4 marks)

Or

12. (a) Solve the difference equation :

$$y(n)+y(n-2)=\delta(n),\ n\geq 0,\ y(-2)=0,\ y(-1)=1.$$ (6 marks)

(b) Find the inverse z-transform of $X(z)=\frac{2z^2+4z}{4z^2-4z+1},\ |z|>\frac{1}{2}$ using partial fraction expansion method. (6 marks)

13. (a) Compute the DFT of the sequence $x(n)=\cos\left(\frac{n\pi}{2}\right)$ where N = 4, using DIF-FFT algorithm. (7 marks)

(b) Compute the circular convolution of $x_1(n)$ Ⓝ $x_2(n)$ for N = 4, $x_1(n)$ = {2, 1, 1, 2}, $x_2(n)$ = {1, – 1, – 1, 1}. (5 marks)

Or

14. The first five points the 8 point DFT of a real valued sequence is given by X[0] = 0, X[1] = 2 + j2, X[2] = –j4, X[3] = 2 – j2, X[4] = 0. Determine the remaining points. Hence find the original sequence $x(n)$ using DIFFFT algorithm.

15. Design the digital Butterworth low-pass filter using impulse invariant transformation for the following specifications :

$0.8 \leq H(e^{jw}) \leq 1$; for $0 \leq w \leq 0.2\ \pi$

$|H(e^{jw})| \leq 0.2$; for $0.6\pi \leq w \leq \pi$.

Or

16. Obtain the direct form I, direct form II, cascade and parallel form realization structures for the following system :

$$H(z)=\frac{(1-2z^{-1})(1-5z^{-1}+z^{-2})}{(1-2z^{-1}+z^{-2})(1+z^{-1}+z^{-2})}.$$

17. Design a symmetric FIR LPF whose desired frequency response is given by $H_d(w) = \begin{cases} e^{-jw\tau}, & \text{for } |w| \leq 1 \\ 0, & \text{otherwise.} \end{cases}$ Use Hamming window.

Or

18. Design a FIR linear phase filter using Kaiser window to meet the following specifications :

$$0.99 \leq |H(e^{jw})| \leq 1.01, \; 0 \leq |w| \leq 0.19\pi$$
$$|H(e^{jw})| \leq 0.01, \; 0.21\pi \leq |w| \leq \pi.$$

19. With neat diagrams, explain the architecture of floating point and fixed point processors of TMS 320 family.

Or

20. With a neat block diagram, explain the sub-band coding used in speech signal processing.

[5 × 12 = 60 marks]

G 1912 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 605—MICROCONTROLLERS AND EMBEDDED SYSTEMS (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. How can timer 0 be used for counting applications ?
2. Explain the single step operation in 8051.
3. If you write to SBUF in serial mode 1, nothing is being transmitted. Why ?
4. How the display is cleared and display position is selected in LCD display ?
5. What is the function of the status register bit IRP in PIC16F877 ?

(5 × 3 = 15 marks)

Part B

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

6. List the SFRs associated with the following functions : (i) timer/counter ; (ii) interrupts ; (iii) I/O ports ; (iv) Serial communication ;and (v) Power saving modes.
7. Explain the various logical instructions in the instruction set of 8051.
8. What are the various SFRs needed while programming a serial port ? Write a program to initialise the serial port of 8051 in mode 1.
9. Explain the principle of frequency measurement with the help of an example.
10. Write an Assembly Language Program for the PIC, to find the square root of a given number.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) How are port latch and port pins of 8051 different ? How does 8051 interrupt that a latch or port pin has to be read ?

    (b) Explain the concept of memory banks.

    (c) What is the need and advantage in having provision for both external and internal program memories ?

Or

12. Explain the internal structure of timer 0 and give the steps involved in operating time in mode 1.

13. Explain the various interrupts in 8051. Describe any one application interrupt with the help of assembly language program and the connection diagram.

Or

14. (a) Draw the format of TMOD register and write the function of each bit in 8051.

    (b) Write a program to perform BCD addition of 8 datas stored successively, starting from the memory location 60H. Store the sum in P1 and carry in P2.

15. It is required to generate a band rate of 2400 in mode 3 of the 8051 serial port. Calculate the required count for timer 1, settings in various SFRs and write an initialization program to transmit and receive the same data byte again and again.

Or

16. (a) Explain the working of RS-232 serial bus standard with necessary diagrams.

    (b) Distinguish between hardware-polled-time and software-polled-time.

17. Draw the circuit diagram for interfacing two 8K × 8 EPROM and two 16 K × 8 RAM chips to 8051. Explain with the help of address mapping table.

Or

18. Interface an ADC with 8051. Write an interrupt routine to read the output data of the converter, store it in memory and collect data for the specified 'n' number of times.

19. What are the various functional blocks in PIC16F877 ? Discuss the architectural features. In what way flash memory devices are useful in designing ?

Or

20. Write an assembly language program to generate square waves at 1.25 kHz frequency with 10 % duty cycle.

(5 × 12 = 60 marks)

G 1943 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 606 L05—BIOMEDICAL ENGINEERING (Elective I) [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. Sketch and label the action potential waveform.
2. Explain phonocardiography with its clinical applications.
3. What are the functions of defibrillators ?
4. What is shortwave diathermy ?
5. List the applications of LASER in diagnosis and therapy.

(5 × 3 = 15 marks)

Part B

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

6. Describe the steps to protect against shock.
7. Explain with EEG waveform, the characteristics of sleep.
8. Explain the need and use of cardiac pacemakers.
9. Explain the differences between positive pressure ventillator and negative pressure ventillator.
10. With neat block diagram, explain the data acquisition system in a CT scanner.

(5 × 5 = 25 marks)

Part C

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

11. How biopotentials are formed ? Discuss the frequency range and voltage ranges of ECG, EEG, EMG and ERG signals.

Or

Turn over

12. (a) Explain micro and macro shock hazards and the methods of remedy.

    (b) Describe the electrical safety analysers.

13. With suitable diagrams, explain Einthoven triangle's properties and the 12-lead configuration of ECG analysis with their respective waveforms.

Or

14. Describe the 10-20 lead system used in EEG and also explain the procedure to record the EEG signal.

15. What are internal and external pacemakers ? Draw and explain them with suitable diagrams.

Or

16. Explain with diagrams, the indirect method of pressure measurements. Compare with the direct methods of pressure measurements.

17. (a) Explain the principle and working of electromagnetic blood flow meter.

    (b) Describe the working of Laser doppler blood flow meter with neat diagrams.

Or

18. With neat sketches of spirogram, describe the parameters of lung volume and capacities.

19. (a) Explain the different types of resolution and how they affect the image quality in CT scanning system.

    (b) Explain with neat diagram, the detectors used in CT scanners.

Or

20. (a) Explain the principle of X-ray generation.

    (b) Draw and explain the block diagram of thermographic equipment and discuss its applications.

(5 × 12 = 60 marks)

G 1944 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 606 L06—RENEWABLE ENERGY RESOURCES (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 sustainable development.
2. Write a note on solar greenhouse.
3. Define photovoltaic system.
4. List the applications of fuel cells.
5. What is the significance of wave energy ?

(5 × 3 = 15 marks)

Part B

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

6. What are the limitations of conventional energy sources ?
7. With a neat sketch, discuss the estimation methods of solar energy.
8. Explain solar cell materials.
9. Discuss the procedure for site selection in wind energy extraction.
10. Write a note on energy and power from the waves.

(5 × 5 = 25 marks)

Part C

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

11. Discuss all the aspects of energy scenario in India. Give the important economic considerations.

Or

12. Explain all the energy sources for sustainable development.

Turn over

13. Discuss the construction, working and applications of solar-based pumping systems.

Or

14. Explain the procedures in the design of a solar water heater.

15. Discuss the following components, importance and applications :

    (i) Module. (4 marks)

    (ii) Panel. (4 marks)

    (iii) Array cell, of a photovoltaic system. (4 marks)

Or

16. Explain the design procedure for a standard PV system.

17. Explain the different modes of wind power generation. Discuss all their applications.

Or

18. How will you compare the energy obtained using wind power at various conversion efficiencies ? Discuss, in detail with the help of block diagrams.

19. Discuss the concept of tidal power. How will you evaluate the energy requirement ? Give all of their applications.

Or

20. Explain the technique for estimation of geothermal power. How will you convert geothermal energy to other forms ?

[5 × 12 = 60 marks]