G 5069 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 802 – SWITCH GEAR AND PROTECTION (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. Explain the are extinction process in alternating current circuit breaker.
2. Give the advantages of distance protection over the over-current protection.
3. Compare the operation of static and electromechanical relays.
4. Explain the pole-slipping phenomenon in the case of an alternator.
5. What are the causes of switching over-voltage surges ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Write a short note on the applications of HRC fuses in power system.
7. What are the merits of induction cup construction over the induction disc construction ?
8. Explain the basic principle of static overcurrent relay.
9. Explain when field suppression in generators is required. How is it achieved ?
10. Give specifications of surge arrestors.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. Derive the expression for reverse recovery voltage and RRRV.

Or

12. Explain the operation of SF_6 circuit breaker. Also state its advantages over others.

Turn over

13. Explain the settings related to circulating current in differential relays.

Or

14. Explain the operation of directional relays.

15. Discuss the operation of microprocessor based over current relay with a schematic diagram.

Or

16. With help of neat sketches describe the principle of a current comparator and a voltage comparator used in distance protection.

17. State and explain different stator protection schemes of alternators.

Or

18. Discuss the faults and various abnormal operating conditions of induction motors and protection provided against each.

19. Explain the term insulation co-ordination. Describe the construction of volt-time curve and the terminology associated with impulse testing.

Or

20. Describe the construction of Zinc-oxide arrester. Describe its advantages over Gapped SiC arrester with reference to volt-ampere characteristics.

(5 × 12 = 60 marks)

G 5082 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 803—ELECTRICAL SYSTEM DESIGN (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. Derive the output equation of DC machine.
2. Discuss about the types of coils used in transformers.
3. What is the use of damper winding ?
4. What is meant by National Electrical Code ?
5. Give the merits and demerits of outdoor substation.

(5 × 3 = 15 marks)

Part B

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

6. Discuss about the guiding factors for choice of number of armature slots.
7. Discuss about the helical windings of transformer.
8. Derive the output equation of three-phase induction motor.
9. Discuss about the light flux method.
10. Write short notes on equipments for indoor substations.

(5 × 5 = 25 marks)

Part C

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

11. A shunt field coil has to develop an m.m.f. of 9000 A. The voltage drop in the coil is 40 V and the resistivity of round wire used is 0.021 m/m and mm^2. The depth of winding is 35 mm. approximately and the length of mean turn is 1.4 m. Design a coil so that the power dissipated is 700 w/m^2 of the total coil surface. Take the diameter of the insulated wire 0.2 mm greater than that of base wire.

Or

12. A 150 kw, 230 V, 500 r.p.m., d.c. shunt motor has a square field coil. Find its number of poles and the main dimensions and air gap length. Assume the average gap density over the pole arc as 0.85 wb/m^2 and the ampere conductor per meter as 29000. The ratio of width of pole body to pole pitch is 0.55 and the ratio of pole arc to pole pitch is 0.7. The efficiency is 91 per cent. Assume that the m.m.f. required for air gap is 55 per cent of armature m.m.f. and the gap contraction factor 1.15.

13. Explain the procedure of a design of a transformer tank with tubes.

Or

14. Calculate the main dimensions and winding details of a 100 kVA, 2000/400 volts, 50 Hz, single-phase shell type, oil immersed, self cooled transformer. Assume voltage per turn, 10 V, flux density in core 1.1 wb/m^2 current density 1.4 A/mm^2, window space factor = 0.33, The ratio of window height to window width and ratio of core depth to width of central limb = 2.5. The stacking factor is 0.9.

15. Determine the main dimensions, turns per phase, number of slots, conductor cross-section and slot area of a 250 H.P., 3-phase, 50 Hz, 400 V, 1410 r.p.m., slip ring induction motor. Assume B_{av} = 0.5 wb/m^2, ac = 3000 A/m efficiency = 0.9 and power factor = 0.9, winding factor = 0.955, current density = 3.5 A/mm^2. The slot space factor is 0.4 and the ratio of core length to pole pitch is 1.2. The machine is delta connected.

Or

16. Determine the main dimensions of a 75000 kVA, 13.8 kV, 50 Hz, 62.5 r.p.m., 3-phase star connected alternator. Also find the number of stator slots, conductor per slot, conductor area and work out the winding details. The peripheral speed should be about 40 m/s. Assume average gap density = 0.05 Wb/m^2 ampere conductors per meter = 40,000 and current density = 4 A/mm^2.

17. A 10 HP, 400 volt, 3 ϕ, 50 Hz motor is to be installed in a workshop of 10 m. × 25 m. Show the layout of the wiring and estimate the quantity of material required and give it approximate cost. The wiring is to be of surface conduct.

Or

18. Draw a neat diagram, showing the position of switch boards, distribution board and accessories with necessary connections in looping in system of a hall of 15 m. × 6 m. × 4.5 m. height. The hall is to be fitted with fan and light points. Assume other missing data.

19. (a) Discuss about the quantity of materials required for GT pipe earthing. (8 marks)

    (b) What do you understand by earthing ? Draw out a neat sketch for earthing by GI pipe. (4 marks)

Or

20. A pole of an overhead 11 kV, 3 ϕ, 50 Hz, line is required to be earthed and a stay provided. Make a neat sketch showing how it should be done. Prepare a list of materials required.

[5 × 12 = 60 marks]

G 5114 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 804 L02—COMPUTER NETWORKS (Elective III) [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. What is guided media ? Give examples.
2. How a stop and wait protocol works ?
3. What is time division multiplexing ? Give example.
4. Identify the class of the following internet protocol address :
   (a) 14.23.120.8.
   (b) 252.5.15.111.
5. Give examples for security threats.

(5 × 3 = 15 marks)

Part B

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

6. Illustrate diagrammatically tree topology.
7. Explain error detection using parity check with an example.
8. How ALOHA protocol works ? Give example.
9. Compare virtual circuit and datagram networks.
10. Outline the need for network management.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Compare a LAN, WAN and MAN. (6 marks)

(b) Discuss with an example the role played by the public switched telephone network in data transfer.

(6 marks)

Or

12. Explain with diagrammatic illustration the functions performed by each layer of the TCP/IP reference model.

13. We want to transmit the message M = 1011001010 (10 bits) ; the pattern P = 111011 (6 bits). Use cyclic redundancy check algorithm to perform the following :

(a) Calculate frame check sequence. (5 marks)

(b) What is the transmitted frame ? (3 marks)

(c) Illustrate how the receiver will detect error, if the second bit and the fourth bit of the transmitted frame are toggled.

(4 marks)

Or

14. Discuss the following data link protocols used in point-to-point lines :

(a) Serial Line Internet Protocol. (6 marks)

(b) Point-to-Point protocol. (6 marks)

15. What is carrier sense multiple access (CSMA) ? How CSMA protocol works ? Explain 1-persistent, p-persistent and non-persistent CSMA with an example.

Or

16. Compare IEEE 802.3 Ethernet, IEEE 802.4 token bus and IEEE 802.5 token ring standards.

17. What is Internet working ? Present an overview of the internet protocol version 4.

Or

18. Compare transmission control protocol and user datagram protocol.

19. What is electronic mail ? Explain with diagrammatic illustration the working of simple mail transfer protocol.

Or

20. (a) What is a domain name system ? Tabulate the top-level internet domains and their meaning. (6 marks)

(b) What is TELNET ? How TELNET works ? (6 marks)

[5 × 12 = 60 marks]

G 5117 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 804 L06 – OPTOELECTRONICS (Elective III) [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. How are chromatic dispersion created?
2. Classify Heterojunctions. Where are they used?
3. What are fibre splicers? How are they used?
4. What are APDs? List their advantages.
5. Give the major reasons which have led to the development of optical amplifiers.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain what is meant by a graded index optical fibre, giving an expression for the possible refractive index profile.
7. Outline the common LED structures for optical fibre communications, discussing their relative merits and drawbacks.
8. Compare and contrast LED *vs*. LASER diodes.
9. Discuss the effect of amplifier and thermal noise.
10. Highlight the features of wave length division multiplexing.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (i) Define the normalized frequency for an optical fibre and explain its use in the determination of the number of guided modes propagating within a step index fibre.

(ii) A step index fibre has a numerical aperture of 0.16, a core refractive index of 1-45 and a core diameter of 60 μm. Determine the normalized frequency for the fibre when light at a wavelength of 0.9 μm is transmitted.

(6 + 6 = 12 marks)

Or

12. Describe Linear Scattering losses in optical fibres with regard to Rayleigh scattering and Mie scattering.

13. Discuss the requirement for population inversion in order that stimulated emission may dominate over spontaneous emission. Illustrate with an energy level diagram.

Or

14. Summarise the laser diode characteristics and the condition for lasing.

15. Explain the structure of Phototransistor. Brief on the parameters of phototransistor.

Or

16. Discuss link power budget and rise time budget and the various approaches to link design.

17. Briefly discuss the possible sources of noise in optical fibre receivers. Discuss quantum noise in detail.

Or

18. Explain pre-amplifier with a neat sketch. Present the pros and cons of pre-amplifier.

19. Identify the main reasons which led to development of optical amplifiers. Outline the attributes and application areas for these devices.

Or

20. Classify fibre optic sensors and discuss the advantages and drawbacks of each.

[5 × 12 = 60 marks]

G 5158 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 805 G06 – DISTRIBUTED POWER SYSTEMS (Elective IV) [EE]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What is a solar cell? Describe its characteristics.
2. What are the principal wind mill components?
3. Describe the working of Wind PV System.
4. What is the principle of Geothermal Energy?
5. Name three conditions that cause power quality problems.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. What are the main applications of Solar PV systems? Describe briefly.
7. Briefly explain, how to calculate the power output from a wind mill?
8. What are the advantages of using Biogas as a fuel?
9. Write a short note on advantages of tidal power.
10. Name five utility power quality problems. Explain any *two*.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. What is the principle of solar photovoltaic power generation? What are the main elements of a PV system?

Or

12. What is the principle of fuel cell? What are the advantages and disadvantages of a fuel cell?

Turn over

13. Derive the expression for power developed due to wind.

Or

14. Describe the main considerations in selecting a site for wind generations.

15. Describe the different schemes for wind electric generation. Also describe the generator control schemes.

Or

16. Compute the system output and current of a PV array for a 100 watt load needed for 24 hours at 24 V, at New Delhi (ϕ = 28° 35'). Mean horizontal insolation from standard map H_0 = 5.4 k Wh/m^2. Also calculate the system output and current if battery charging efficiency, battery self discharge level and variability factor are 0.9, 0.9 and 0.95 respectively.

17. Describe some applications of biogas in power generation.

Or

18. Describe the various stages in the anaerobic digestion by a diagram.

19. A supply voltage has a fundamental frequency component of V_1 and harmonic voltages of V_5 8% of V_1, V_7 = 5% of V_1, V_{11} = 3% of V_1 and V_{13} = 1% of V_1 is applied to a capacitor bank. Calculate the effective r.m.s. voltage across the capacitor, the value of THD_V (Total Harmonic Distortion).

Or

20. The most important power quality parameter to a utility is : (a) Primary voltage ; (b) Primary current ; (c) Secondary voltage ; (d) Secondary current, Explain.

(5 × 12 = 60 marks)

19. Derive the condition for small signal stability (steady state stability) of a generator connected to an infinite bus :

    (i) When damping is neglected.

    (ii) When damping is considered.

Or

20. A 50 Hz, 4-pole turbo alternator rated 150 MVA, 11 kV has an inertia constant of 9 MJ/MVA. Find the :

    (a) Stored energy at synchronous speed.

    (b) The rotor acceleration if the input mechanical power is raised to 100 MW when the electrical load is 75 MW.

    (c) The speed at the end of 10 cycles if acceleration is assumed constant at the initial value.

(5 × 12 = 60 marks)

G 5056 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 801—POWER SYSTEM ANALYSIS (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 per unit quantity. Mention the advantages of per unit system.
2. What are the different types of buses in a power system ? How are they classified ?
3. What is the need for voltage control in a power system ?
4. Name the fault in which positive, negative and zero sequence component currents are equal.
5. Define swing curve. What is the use of swing curve ?

(5 × 3 = 15 marks)

Part B

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

6. Explain the significance of slack bus in load flow analysis.
7. Explain how optimal load scheduling is done for a power system having only thermal plants when transmission losses are neglected.
8. What is load frequency control ? Briefly explain with a block diagram the model of a load frequency control for an isolated power system.
9. Briefly explain about the selection of circuit breakers.
10. Explain equal area criterion method for assessing transient stability. What are its limitations ?

(5 × 5 = 25 marks)

Part C

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

11. Explain the N-R method of load flow studies using Y – Bus with the help of flowchart. Compare this method with the decoupled load flow method.

Or

12. A single line diagram of a power system is shown in Fig.1. Draw the positive-sequence impedance diagram showing all impedances in per unit choose a base of 10 MVA, 12.5 kV in the load circuit.

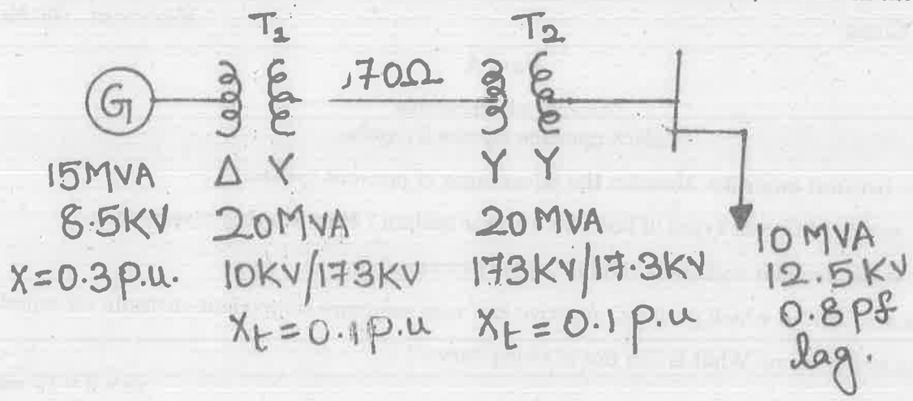

Fig. 1

The ratings are as below :

Generator G : 15 MVA, 3-phase, 8.5 kV, X = 0.3 p.u., Δ-Y Transformer T_1 : 20 MVA, 10 kV/173 kV, X_t = 1.0 p.u., Y – Y Transformer T_2 : 20 MVA, 173 kV/17.3 kV, X_t = 0.1 p.u. LOAD is drawing 10 MVA at 12.5 kV and 0.8 p.f. lag. Transmission line total series reactance = j 70 Ω.

13. Incremental fuel costs in Rs. per Megawatt-hour for two units in a plant are given by :

$$\frac{dF_1}{dP_1} = 0.1\,P_1 + 20.0$$

$$\frac{dF_2}{dP_2} = 0.12\,P_2 + 16.0$$

The minimum and maximum load on each unit are to be 20 MW and 125 MW respectively. Determine the incremental fuel cost and the allocation of load between units for the minimum cost when loads are (i) 100 MW ; (ii) 150 MW. Assume both the units are operating.

Or

14. Find B_{11}, B_{12} and B_{22} (loss coefficients) for the system shown in Fig. 2 given :

$Z_a = (0.02 + j\,0.12)$ *p.u.*
$Z_b = (0.04 + j\,0.14)$ *p.u.*
$Zc = (0.01 + j\,0.09)$ *p.u.* and $V_3 = 1.1\angle 0^\circ$ *p.u.*
$I_a = 1.2\angle 2^\circ$ *p.u.* and $I_b = 0.8\angle 0^\circ$ *p.u.*

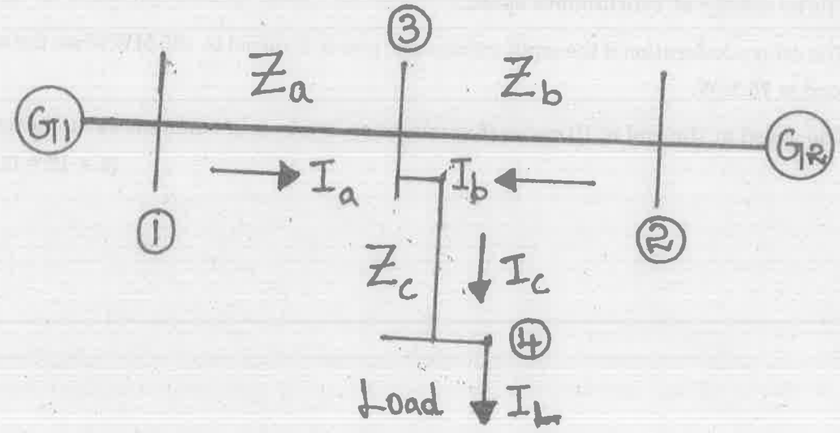

Fig. 2

15. Derive the complete block diagram for the Automatic Load Frequency control for an isolated generator supplying a load.

Or

16. How does an integral controller in the feedback path of an ALFC (Automatic Load Frequency Control) help in improving stability ?

17. Draw the diagram showing interconnection of sequence networks for a double line to ground fault, and derive the equation for sequence current.

Or

18. A synchronous generator and motor are rated 30 MVA, 13.2 kV, and both have subtransient reactances of 20%. The line connecting them has a reactance of 10% on the base of the machine ratings. The motor is drawing 20 MW at 0.8 p.f. leading and a terminal voltage of 12.8 kV when a symmetrical three-phase fault occurs at the motor terminals. Find the subtransient current in the generator, motor and fault current.