B.TECH. DEGREE EXAMINATION, MAY 2018

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. What is the need for system analysis in planning and operation of power system ?

2. What is the significance of economic load dispatch ?

3. What is load frequency control ? Explain.

4. Distinguish between symmetrical and unsymmetrical short circuits.

5. Define dynamic stability with an example.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Compare Gauss-Siedel and Newton-Raphson method.

7. What are system constraints ?

8. Explain the operation of tie-line Controls for two area system.

9. Express the unbalanced voltages Va, Vb and Vc in terms of symmetrical components $Va1, Va2$ and $Va0$.

10. Obtain the swing equation of a generator supplying power to an infinite bus.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each full question carries 12 marks.

11. For the sample system shown in the Fig 1, the generators are connected at all four buses while the loads are at buses 2 and 3. Assuming a flat voltage start, find bus **voltages** and bus angles at the end of first Gauss-Seidal iterations and consider the reactive power limit as $0.2 \leq Q2 \leq 1$.

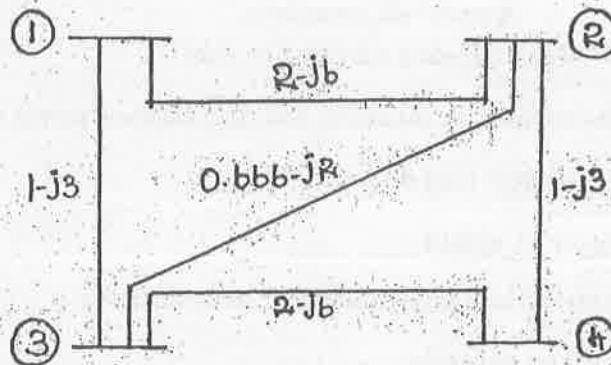 | Bus | | P in Pu | Q in Pu | V in Pu | Remarks |
    |-----|-----|---------|---------|---------|---------|
    | 1 | ... | — | — | 1.04 $\lfloor$ 0° | Slack bus |
    | 2 | ... | 0.5 | — | 1.04 Pu | PV bus |
    | 3 | ... | −1.0 | 0.5 | — | PQ bus |
    | 4 | ... | 0.3 | − 0.1 | — | PQ bus |

Fig. 1

Or

12. Prepare a per phase schematic of the system in Fig. 2 and show **all the impedance in** per unit on a 100 MVA, 132 kV base in the transmission line circuit. The necessary data are given as follows.

    G1 : 50 MVA, 12.2 kV, X = 0.15 pu.

    G2 : 20 MVA, 13.8 kV, X = 0.15 pu.

    T1 : 80 MVA, 12.2/161 kV, X = 0.1 pu.

    T2 : 40 MVA, 13.8/161 kV, X = 0.1 pu.

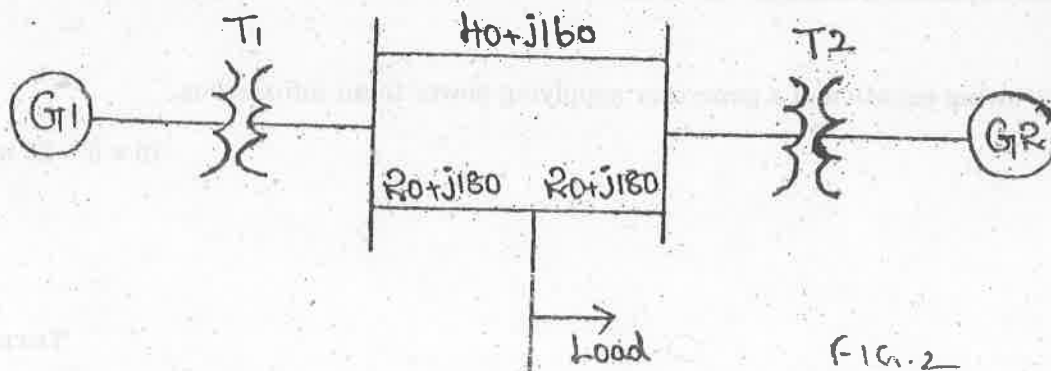   LOAD : 50 MVA, 0.8 power factor lag operating at 154 kV. Determine the pu impedance of the load.

FIG. 2

13. Explain in detail about the physical interpretation of co-ordination equations ? What are β coefficients ?

Or

14. The fuel inputs per hour of plants 1 and 2 are as given:

F1 = 0.2 P12 + 40P1 + 120 Rs/hr

F2 = 0.25 P12 + 30P1 + 150 Rs/hr.

Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit are 100 MW and 25 MW and the demand is 180 MW and transmission loses are neglected. If the load is equally shared by both the units, determine the savings obtained by loading the units as per the equal incremental production cost.

15. What is area control error and Control area ? Obtain the state space model of single area frequency control.

Or

16. Explain the model of speed governor system. What is speed governor dead band and what is its effect on automatic generation control ?

17. For the radial network shown in Fig. 3, a 3-phase fault occurs at point F. Determine the fault current.

FIG-3

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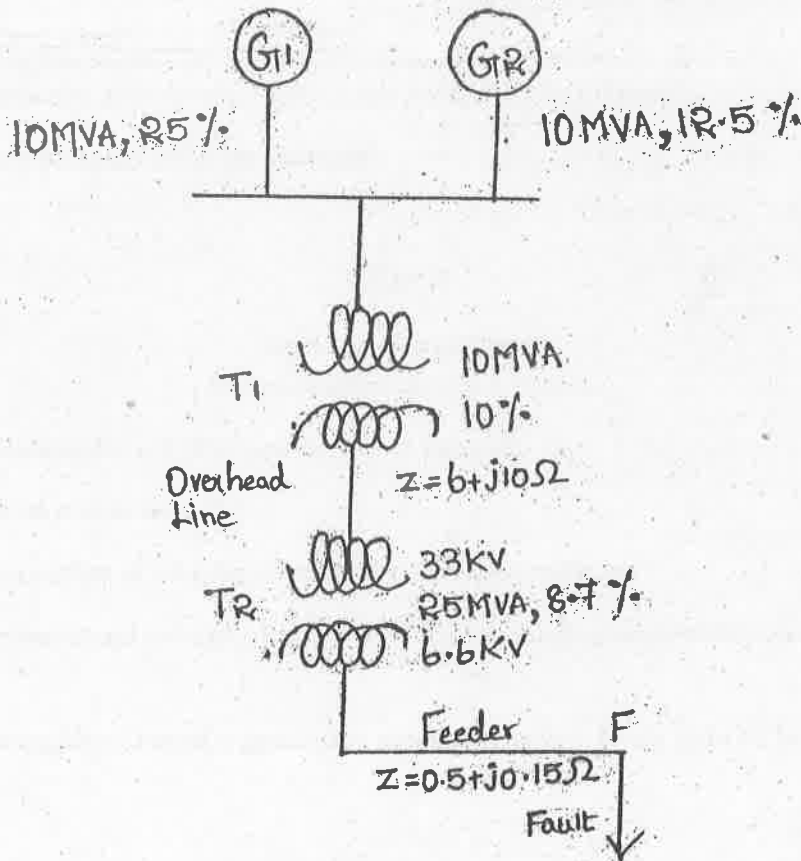
B.TECH. DEGREE EXAMINATION, MAY 2018

Eighth Semester .

Electrical and Electronics Engineering

EE 010 802—SWITCH GEAR AND PROTECTION (EE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 marks.

Describe the functions of circuit breaker.

Explain primary and back up protection

Describe different components of static relays.

Explain the protection of transformer against magnetising in rush current.

What is ground wire? Explain its importance.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 marks.

Describe current zero arc interruption method.

Explain the basic requirements of a protective system.

What are the advantages of static relays over electromagnetic relays

Explain percentage differential protection used for the stator protection of generator.

What is switching overvoltage? How does it happen in power system?

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. Explain the construction and working of Vaccum circuit breaker.

Or

12. (a) Explain the interruption of capacitive current in circuit breaker. (6 marks)

    (b) Explain Restriking voltage and Recovery voltage. (6 marks)

13 Explain the working of directional over current relay with neat circuit diagram.

Or

14 (a) Explain the operating principle of an impedance relay. (6 marks)

    (b) Explain biased percentage differential relays (6 marks)

15. With block diagram and flow chart, explain the operation of impedance relay using microprocessor.

Or

16. Explain the working of static differential relay. List the demerits of static relays.

17. Explain the stator and rotor protection of AC generator.

Or

18. With neat circuit diagram, Explain the working of buchholz relay.

19. Explain the working of surge arrestor with neat circuit diagram.

Or

20. Write short notes on the following:

    (i) Causes of overvoltage in power system (6 marks)

    (ii) Insulation coordination (6 marks)

    (5 × 12 = 60 marks)

G 1345   (Pages : 3)   Reg. No................................

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B.TECH. DEGREE EXAMINATION, MAY 2018

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. What are the disadvantages of higher specific electric loading and higher specific magnetic loading in DC machine.

2. Compare shell type and core type transformers.

3. Compare squirrel cage and wound rotor induction motor.

4. Briefly explain the devices used for protection against electric shock.

5. Explain touch potential and step potential.

                                                     (5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Derive the output equation of DC machine.

7. Explain window space factor. What is its significance ?

8. Explain different parameters that influence the specific magnetic loading of synchronous machine.

9. Explain the electrical installation and wiring of high rise building.

10. Explain Earth-Mat.

                                                     (5 × 5 = 25 marks)

Turn over

Part C

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

11. Determine the main dimensions, number of poles and length of air gap of a 620 KW, 550 V, 900 *r.p.m.* DC generator. Assume average flux density in air gap as 0.06 wb/m^2 and ampere conductor per meter as 35000. the ratio of pole arc to pole pitch os 0.7 and the efficiency is 90 per cent. The mmf required for air gap is 50 percent of armature mmf and gap contraction factor is 1.15. The following are the design constraints :

> Peripheral speed should not be greater than 42 m/s. frequency of flux reversals should not be greater than 50Hz, current per brush arm sahould not be greater than 450 A and armature mmf per pole should not be greater than 8000 A.

Or

12. Explain the design procedure of shunt field winding for a small DC machine.

13. Calculate the main dimensions and winding details of a 150 KVA, 11000/400 V, 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 = 2A/mm^2, window space factor = 0.33. the ratio of window height to window width = 2.5, ratio of core depth to width of central limb = 2.75 and the stacking factor = 0.9.

Or

14. A 300 kvA, 11000/400 V, 3 phase core type transofrmer has a total loss of 5000 watts at full load. The transofrmer tank is 1.25 m in height and 1m × 0.75 m in plan. Design a suitable scheme for tubes if the average temperature rise is to be limited to 36º C. The diameter of tubes is 50 mm and are spaced 75 mm from each other. The average height of tubes is 1.05 m. Specific heat dissipation due to radiation = 6 w/m^{2}ºC and specific heat dissipation due to convection = 6.5 w/m^2–ºC. Assume that convection is improved by 35 percent due to provision of tubes.

15. Derive the output equation of Synchronous machine.

Or

16. Determine the main dimensions of a 3000 kVA, 187.5 r.p.m., 50 Hz, 3 phase, 3000 V salient pole Synchronous generator. The generator is to be a vertical, water wheel type. The specific magnetic loading is 0.6 wb/m^2 and the specific electrical loading is 34000 A/m. Use circular poles with ratio of core length to pole pitch ≐ 0.65. The run-away speed is 2 times the Synchronous speed.

17. Estimate the quantity of material required for wiring the residential building plan shown below. The position of the electric points have been shown in figure. Draw neat wiring diagram.
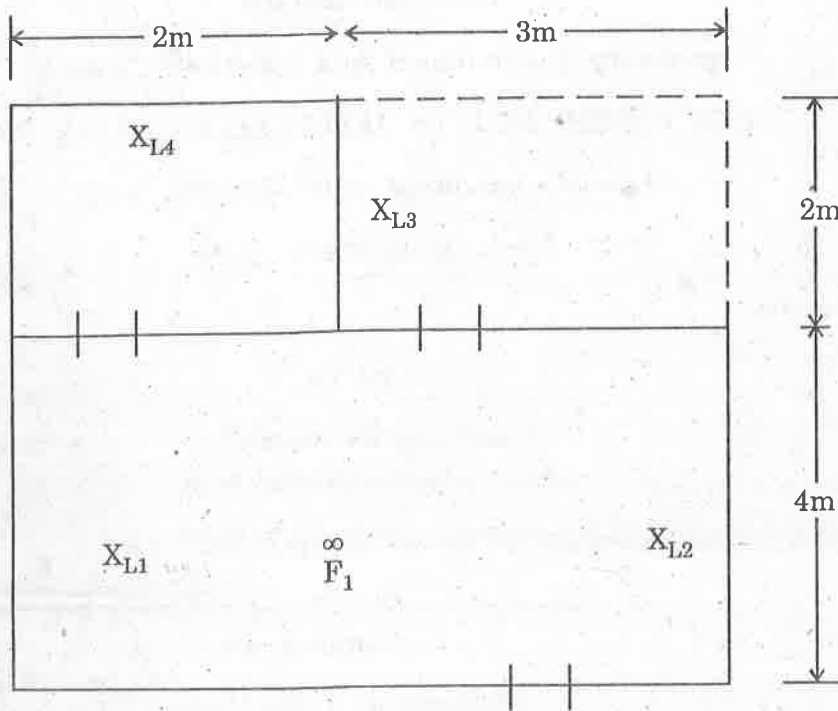
Plan of the residential building

Or

18. With neat layout, Estimate the quantity of materilas reuired for witing cinema theatre with 800 seats.

19. With neat diagram, explain pipe earthing and plate earthing.

Or

20. Estimate the main materials required for a 750 m 415/240 V, three phase line with four wires vertical configuration. The lines emanate frm a substation to feed a load of 30kW. take the span between two poles as 50 m. The size of the conductor is ACSR 6/1 × 2.59 mm.

(5 × 12 = 60 marks)

G 1377

(Pages : 2)

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B.TECH. DEGREE EXAMINATION, MAY 2018

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. Differentiate between a MAN and a WAN.

2. Outline the key features of point-to-point protocol.

3. What is a wireless LAN ?

4. Outline the functions performed by a gateway.

5. What is encryption? Give example.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5marks.

6. Explain with an example simplex, half duplex and full duplex communication.

7. What is parity check ? Give example.

8. Outline the working of carrier sense multiple access protocol.

9. Explain flooding and selective flooding with an example.

10. What is a domain name system? Outline with an example.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. What is topology ? Outline with a diagram bus, star and ring topologies.

Or

12. Explain with a diagram the Open Systems Interconnection reference model.

13. We want to transmit the message M = 1110101010 (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. Explain with an example the stop-and-wait protocol and sliding window protocol.

15. Explain with an example the working of the following protocols :

    (a) Slotted ALOHA.   (6 marks)

    (b) CSMA / CA.   (6 marks)

Or

16. Explain IEEE 802.4 token bus standard.

17. What is congestion control ? Explain any two congestion control algorithms with an example.

Or

18. Explain, with an example connection establishment and connection release in transmission control protocol.

19. What is cryptography ? Explain with an example data encryption standard.

Or

20. Appraise the major activities involved in network management.

         [5 × 12 = 60 marks]

G 1380

Reg. No............................

Name.............................

B.TECH. DEGREE EXAMINATION, MAY 2018

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 804 L06—OPTO ELECTRONICS (Elective III) [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. Distinguish phase and group velocity modes.

2. What is meant by injection efficiency ?

3. What are the requirements for optical detectors ?

4. Explain amplifier equalization and sensitivity in fibre optic receiver system.

5. Give the principle of Raman amplifier.

(5 × 3 = 15 marks)

Part B

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

6. Explain signal degradation in optical fibre system.

7. Explain the characteristics of laser diodes.

8. What is meant by equalisation and sensitivity in case of fibre optic receivers ?

9. What is meant by wavelength Division Multiplexing ? Explain its types.

10. Explain optical logic gates.

(5 × 5 = 25 marks)

Part C

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

11. Explain in detail about the electromagnetic mode theory. What are phase and group velocity modes ?

Or

Turn over

12. With necessary equations, explain the diffeernt losses in OFC.

13. Explain in detail about LEO as an optical source. What is meant by heterojunction LEO's ?

Or

14. Write short notes on :

    (a) LED *versus* LASER diodes.

    (b) Direct and indirect band gap materials.

    (c) LED modulation.

                                  (3 × 4 = 12 marks)

15. Explain the different kinds of splicing techniques with the help of neat sketches.

Or

16. Write short notes on :

    (a) APD bandwidth and noise.

    (b) Quantum efficiency.

    (c) Photo diode.

                                  (3 × 4 = 12 marks)

17. Explain fibre optic receiver system with block diagram.

Or

18. Explain about amplifier design of receiver section in OFC. Also discuss the effect of thermal noise in practical system.

19. Explain the principle of fibre optic sensor system for strain and displacement measurement.

Or

20. Give the working principle of Erbium doped optical amplifiers.

                                  [5 × 12 = 60 marks]

G 1421　　　　　　(Pages : 3)　　　　　Reg. No.............................

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B.TECH. DEGREE EXAMINATION, MAY 2018

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 805 G06—DISTRIBUTED POWER SYSTEM (Elective IV) [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. Give PV system classification and describe it through neat figures.

2. What is power circle diagram ? How the changes in operating condition of an induction generator can be explained through circle diagrams ?

3. What is grid congestion ? How it can be avoided ?

4. How electricity can be produced through geothermal field ? Name also the various markets of geothermal energy.

5. Describe "islanding" in Distribution Generation (DG) systems.

　　　　　　　　　　　　　　　　　　　　　　　　(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. (a) List the losses in fuel cell's and define them.　　　　　(3 marks)

　　(b) Draw the block diagram showing the operation of a fuel cell.　　(2 marks)

7. Explain "Grid connection of wind power" through a block diagram.

8. What is an induction generator ? How it can be excited ? Mention its uses and limitations. Draw the schematic diagram of a standalone self-excited induction generator.

9. Explain Ocean Thermal Energy Conversion Technology.

10. Define Ferro resonance. How it differs from resonance in linear systems ? Explain it with a simple circuit.

　　　　　　　　　　　　　　　　　　　　　　　　[5 × 5 = 25 marks]

Turn over

Part C

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

11. (a) Name five different solar collectors and classify them based on their use.   (3 marks)

    (b) What are solar tracking devices ? How it works ?   (4 marks)

    (c) Draw the band diagram of a solar cell and mark each band clearly.   (3 marks)

    (d) Define solar cell and give its classification.   (2 marks)

Or

12. Give the classification of fuel cells based on type of electrolytes and describe any three of them with their operating data, application and advantages.

13. A propeller type wind turbine has the following data :

    Speed of free wind at a height of 10 m. = 12 m/s
    Air density   = 1.226 kg./m.^{3}
    α   = 0.14
    Height of tower   = 100 m.
    Diameter of rotor   = 80 m.
    Wind velocity at the turbine reduces by 20 %.
    Generator efficiency = 85 %.

    Find :

    (i) Total power available in wind.

    (ii) Power extracted by the turbine.

    (iii) Electrical Power generated.

    (iv) Axial thrust on the turbine.

Or

14. (a) Define power density of wind and compare it with power density of solar. Discuss its impact on wind energy conversion.

                                                                                    (3 marks)

    (b) Name the two primary mechanisms for producing force from wind and define them. Illustrate the mechanism of producing it.

                                                                                    (4 marks)

    (c) Derive the mathematical equation for wind power produced through wind energy conversion.

                                                                                    (5 marks)

15. (a) What is the need for wind solar energy integration ? Draw the flow chart for wind solar integration system. Discuss about the control system related to it.

                                                                                    (4 marks)

(b) "Fuel savings make a powerful case for hybrid diesel generating systems." Justify the comment.

(4 marks)

(c) What is meant by "Grid codes for wind integration" ? Name them and describe.   (4 marks)

Or

16. (a) Draw the block diagram of a Permanent Magnet Alternator Based Wind Energy Conversion System and explain it together with the related control system used.

(6 marks)

(b) What is meant by modelling of permanent magnet alternator used in wind energy conversion systems ? Draw the circuit model of permanent magnet alternator and explain it.

(6 marks)

17. (a) Describe land, shelf and floating ocean thermal energy conversion system.   (4 marks)

(b) What are biofuels ? Name the two commonly used ones. Explain them. Discuss also about the production cost and market of biofuels in present scenario.

(8 marks)

Or

18. Estimate the power available from a proposed micro hydro scheme at a site having a small stream with 100 litres per second at a head 30 m. Assume density of fresh water as 996 kg./m.^{3} and overall efficiency of the wheel system as 55 %.

19. (a) Write a note on "siting and size of distributed generation systems".   (4 marks)

(b) A supply voltage has a fundamental frequency component of V_1 and harmonic voltages of V_3 = 2 %, V_5 = 3 % and V_7 = 1 % V_1. Find the value of Total Harmonic Distortion (THD) and Harmonic Voltage Factor (HVF).

(8 marks)

Or

20. (a) Discuss about the sources of harmonics in Distributed Generation Systems.   (4 marks)

(b) Describe sustained interruption in power quality systems.   (3 marks)

(c) How the equipment sensitivity to voltage sag is divided in PQ systems ? Describe them.

(5 marks)

[5 × 12 = 60 marks]