

FACULTY OF ENGINEERING
B.E. 4/4 (EEE) II - Semester (Old) Examination, May 2014

Subject : Electrical Power Distribution Engineering
(Elective- II)

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

- 1 Define Coincidence factor and Diversified factor. (3)
- 2 Mention the types of distribution transformers. (2)
- 3 Explain in brief the breaks and a half bus scheme. (3)
- 4 Based on what factors the distribution substation rating is decided. (2)
- 5 What is secondary banking? Mention the advantages of secondary banking. (3)
- 6 How is a network transformer different from a conventional transformer? (2)
- 7 What are the measures taken to reduce voltage flickering? (2)
- 8 Explain the effect of shunt capacitors in distribution systems. (3)
- 9 Mention any three functions of distribution automation. (3)
- 10 What is SCADA? (2)

PART – B (50 Marks)

- 11 (a) Explain the types of distribution transformers. (5)
- (b) Define the following:
 - (i) Load factor (ii) Contribution factor (iii) Diversity factor (5)
- 12 (a) Derive an equation for substation rating and voltage drop for a substation served by 'n' primary feeders. (7)
- (b) What is the need of application curves? (3)
- 13 (a) Write the expression for general TAC equation and explain each term. (4)
- (b) Explain about loop type primary feeder and primary feeders network with neat sketches. (6)
- 14 (a) Compare a single phase two wise ungrounded lateral with three phase system for voltage drop and power loss calculations. (5)
- (b) Explain the economic benefits that are derived from capacitor installation. (5)
- 15 (a) Explain in detail the control functions of SCADA. (6)
- (b) Explain about AMR. (4)
- 16 (a) Explain radial type and loop type of subtransmission. (5)
- (b) A 3- Φ , 500Hp, 60Hz, 4160V, Y-connected induction motor has a full load efficiency of 88%, lagging pf of 0.75 and is connected to a feeder. It is desired to correct the pf of the load to a lagging pf of 0.9 by connecting three capacitors at the load. Determine the following: (5)
 - (i) The rating of the capacitor bank
 - (ii) The capacitance of each unit in μF , if they are connected in delta.
- 17 Write short notes on the following: (10)
 - (a) Radial type primary feeder
 - (b) CIS

FACULTY OF ENGINEERING
B.E. 4/4 (EEE) II-Semester (Old) Examination, May 2014

Subject : High Voltage Engineering (Elective-II)

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

- 1 Define Time lag for breakdown of gas. (2)
- 2 What are the various properties required for providing insulation and arc interruption? (3)
- 3 Explain the output voltage waveform of a half wave rectifier with capacitor. (3)
- 4 What is the need for cascading the transformers? (2)
- 5 Define Impulse flash over voltage. (2)
- 6 Draw the exact equivalent circuit of a single stage impulse generator. (3)
- 7 What are the requirements of a sphere gap for measurement of high voltage. (2)
- 8 A peak reading voltmeter is required to measure voltage upto 150kV. The peak voltmeter uses as RC circuit, a micro ammeter and a capacitance potential divides. The potential divides has a ratio of 1200 : 1 and the micrometer can read upto 10 μ A. Determine the value of R and C if the time constant of RC circuit is 8 seconds. (3)
- 9 What are the drawbacks of field type testing station? (2)
- 10 List out the various tests to be carried out on a power Transformer. (3)

PART – B (50 Marks)

- 11 Explain various theories of breakdown in liquid dielectrics. (10)
- 12 Explain clearly the basic principle of operation of an electrostatic generator. Describe with neat diagram. Mention the applications of Van-de-Graf generator. (10)
- 13 (a) Derive an expression for voltage efficiency of a single stage impulse generator. (5)
 (b) A ten stage impulse generator has 0.250 μ F condensers. The wave front and wave tail resistance are 75 Ω and 2600 Ω respectively. If the load capacitance is 2.5 nF, determine the wave front and wave tail times of the impulse wave. (5)
- 14 Explain with neat diagram the principle of operation of an electrostatic voltmeter. Discuss its advantages and disadvantages for high voltage measurements. (10)
- 15 Explain clearly the various electrical tests done on circuit breaks in the high voltage laboratories. (10)
- 16 (a) Explain the process of breakdown in electronegative gases. (5)
 (b) Describe with neat diagram a three stage cascade transformer. (5)
- 17 Write short notes on the following:
 (a) Chubb-fortescue method
 (b) Voltage and power ratings of the equipment

FACULTY OF ENGINEERING
B.E. 4/4 (EEE) II - Semester (Old) Examination, May 2014

Subject : Optimization Methods (Elective-II)

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part - B.

PART – A (25 Marks)

- 1 Find all the local maxima and minima for the following function (3)
 $F(x, y) = -x^2 + xy - y^2 + 2x - y$
- 2 State the necessary and sufficient conditions for existence of relative optima in case of multivariable optimization with equality constraints. (2)
- 3 List out the limitations of Linear Programming Problems. (2)
- 4 With suitable examples differentiate a slack and a surplus variable. (3)
- 5 Explain why is Powell's method called a pattern search method. (2)
- 6 List out the limitations of Fibonacci method. (3)
- 7 What are the convergent criteria can be used to terminate the iterative process of steepest descent method? (3)
- 8 List out the remarks of Fletcher- Reeves method. (2)
- 9 State the principle of optimality in dynamic programming. (2)
- 10 List out the characteristics of dynamic programming problem. (3)

PART – B (50 Marks)

- 11 Minimize the function
 $h(x, y) = -x^2 - y^2$
 subjected to
 $2x + y = 10$
 By using Lagrangian multipliers method (10)
- 12 Maximize $f = -2x_1 - x_2 - 5x_3$
 Subject to $x_1 - 2x_2 + x_3 \leq 18$
 $3x_1 - 2x_2 \geq -8$
 $2x_1 + x_2 - 2x_3 \leq -40$ Solve by using simplex method. (10)
- 13 Minimize the function $f = 100(x_2 - x_1^2)^2 + (1 - x_1)^2$ starting from the point $X_1 = \begin{Bmatrix} -1 \\ 0 \end{Bmatrix}$
 Also the direction $S = \begin{Bmatrix} 2 \\ 0 \end{Bmatrix}$ using the Fibonacci method with $L_0 = (0, 0.1)$.
- 14 Minimization of the function $f(x_1, x_2) = 100(x_1^2 - x_2) + (1 - x_1^2)$
 Starting from $X_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ using steepest descent method. (10)
- 15 Use the dynamic programming to solve the following problem. (10)
 $\text{Min } z = y_1^2 + y_2^2 + y_3^2$. Subject to the constraint $y_1 + 2y_2 + y_3 \geq 10$ and $y_1, y_2, y_3 \geq 0$. (10)
- 16 State and prove the necessary and sufficient conditions for a single variable optimization. (10)
- 17 Draw the flow chart for the two phase simplex method. (10)

FACULTY OF ENGINEERING

B.E. 4/4 (EEE / Inst.) II – Semester (New) (Main) Examination, May 2014

Subject: Optimization Methods (Elective – II)**Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part - B.****PART – A (25 Marks)**

- 1 Classify the optimization problems. 3
- 2 What is the difference between the bound point and a free point in the design space? 2
- 3 List out the advantages and limitations of Linear Programming Problem. 3
- 4 What is the difference between the simplex algorithm and the simplex method? 2
- 5 With suitable examples explain the Unimodal function. 2
- 6 Draw the flow chart to implement golden section method. 3
- 7 Compare One-Dimensional Minimization Methods. 2
- 8 Obtain the gradient of the function $f(x) = 10x_1^4 - 20x_1^2x_2 + 10x_2^2 + x_1^2 - 2x_1 + 5$
Starting from $X_1 = \begin{Bmatrix} 1 \\ 1 \end{Bmatrix}$. 3
- 9 State the Bellman's principle of optimality. 2
- 10 Formulate the following problem as a dynamic programming problem.
 $Z = (x_1+2) + x_2x_3 - (x_4-5)^2$ subjected to $x_1+x_2+x_3+x_4 \leq 5$ and x_1, x_2, x_3 are non-negative integers. 3

PART – B (50 Marks)

- 11 Minimize $f = x_1^2 + x_2^2 + 80x_1$ subjected to the constraints
 $g_1 = x_1 - 80 \geq 0$
 $g_2 = x_1 + x_2 - 120 \geq 0$
 Using Kuhn – Tucker conditions. 10
- 12 Maximize $f = 240s_1 + 104s_2 + 60s_3 + 19s_4$
 subject to
 $20s_1 + 9s_2 + 6s_3 + s_4 \leq 20$
 $10s_1 + 4s_2 + 2s_3 + s_4 \leq 10$
 $S_i \geq 0, i = 1$ to 4
 Find all the basic feasible solutions of the problem and identify the optimal solution. 10
- 13 Minimize a uni-modal function $f(x) = e^{3x} + 5e^{-2x}$
 With the limits $[0, 1]$ using Fibonacci search method. 10

FACULTY OF ENGINEERING
B.E. 4/4 (EEE) II - Semester (Old) Examination, May 2014

Subject : Renewable Energy Sources (Elective-II)

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

- 1 What is the criterion is used for assessing the potential of NCES? (2)
- 2 What are the limitations of renewable energy sources? (3)
- 3 Distinguish between global and diffused radiation. (2)
- 4 Explain the principle of operation of flat plate type of collector. (3)
- 5 Derive the expression for power in the wind. (3)
- 6 Explain the working principle of wind power plant. (2)
- 7 What are the main differences between conventional thermal power plant and geothermal power plant? (3)
- 8 Explain the process of Pyrolysis. (2)
- 9 What is the status of multiple OTEC systems? (2)
- 10 Differentiate between tidal and wave power generation. (2)

PART – B (50 Marks)

- 11 (a) What are the independent primary energy sources provide to earth explain them with energy flow in the earth diagram? Discuss different renewable energy sources with special reference of Indian context. (6)
- (b) Discuss about the unresolved issues that makes a meaningful contribution to the energy sectors of developing countries. (4)
- 12 (a) Explain Brayton solar engine with necessary neat diagram. (5)
- (b) Explain how the calculation of energy through photovoltaic power generation is carried out. (5)
- 13 (a) Derive the expression lift and drag forces wind. (5)
- (b) Explain the working of horizontal axis wind mills with suitable diagrams. (5)
- 14 (a) Explain the working principle any two of chullas used for rural energy needs. (6)
- (b) Explain any exhaust type conventional steam turbine with necessary diagram. (4)
- 15 (a) Discuss in detail about economics aspects of OTEC. (4)
- (b) Explain in detail about the design of 5 MW OTEC pro commercial plant. (6)
- 16 (a) With neat diagram explain any two types of concentrating types of solar collectors. (5)
- (b) With necessary diagram explain the working principle of induction generator. (5)
- 17 Discuss the following: (5 + 5)
 - (a) Stirling solar engine
 - (b) Grid connected solar power satellite
