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10EE81

Eighth Semester B.E. Degree Examination, June/July 2015
Electrical Design, Estimating & Costing

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What is estimating and what are the importance of the estimating and costing? **(04 Marks)**

b. Explain the followings: i) Electrical schedules ii) Catalogues iii) Purchase system. iv) Market survey. **(08 Marks)**

c. List out guidelines for inviting tenders. **(08 Marks)**

2 a. List the general rules guide lines for residential installation. **(06 Marks)**

b. Estimating the quantity of materials required for wiring a newly constructed building where plan is as shown in Fig. Q2 (b). Assume the details of the load. All dimensions are in meters. **(14 Marks)**

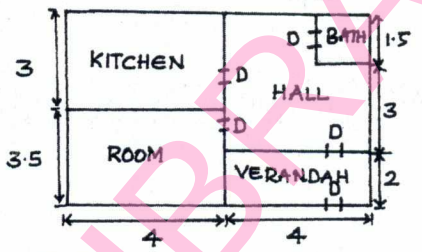

Fig. Q2 (b)

3 a. Explain the determination of load calculation selection of size of service connection and nature of supply. **(06 Marks)**

b. Fig. Q3 (b) shows the plan of ground floor of school building. School building consists at ground floor, 1st floor and 2nd floor having same plan that of ground floor.
Draw single line diagram for ground floor and calculate material required for three floors. **(14 Marks)**

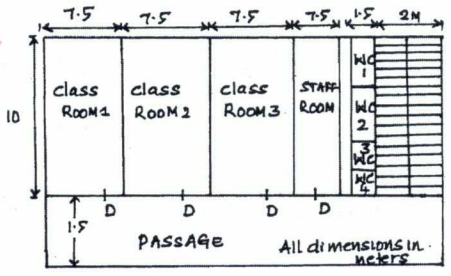

Fig. Q3 (b)

4 a. Write a short note on service lines. **(06 Marks)**

b. Write the reasons for excess recording of energy consumption by energy meter. **(06 Marks)**

c. Find the material required for 1-ϕ overhead service lines of a house located 10 meters away from pole, with following loads:
Lighting = 300 watts, Heating = 2500 watts.
Assume Safety factor = 2. **(08 Marks)**

PART – B

5 a. Explain determination of input power, input current to motors and rating of cables. **(06 Marks)**

b. A 10 H.P. (metric), 415 V, 3ϕ, 50 Hz squirrel cage induction motor is to be installed in a flour mill, the plan of which is shown in Fig. Q5 (b). Show the wiring diagram of the layout and estimate the quantity of materials required and its cost. **(14 Marks)**

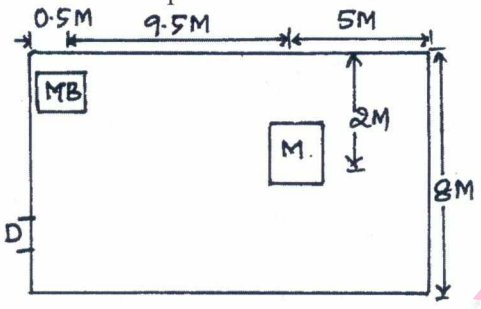

Fig. Q5 (b)

6 a. What are the main requirements of the line supports? Describe factors governing height of pole? **(08 Marks)**

b. Estimate quantity of materials required for adding 132 KV bay at 132 KV grid substations. **(12 Marks)**

7 a. List the points to be considered at the time of errection of overhead lines. **(08 Marks)**

b. A pole for an overhead 11 KV-3 phase, 50 Hz line is required to be earthed (pipe) and a stay is to be provided. Make a neat sketch showing how it should be done. Prepare a list of materials required. **(12 Marks)**

8 a. Write short notes on indoor substation? List advantages and disadvantages of outdoor substation over indoor substation. **(08 Marks)**

b. Estimate the quantity of material required for installation of 132/33 KV substation with main and transfer bus scheme having 2×40 MVA transformers. **(12 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2015

Power System Operation and Control

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the function of a typical digital computer control and monitoring of a power system with the help of a block diagram. **(10 Marks)**

b. Two areas are interconnected as shown in Fig.Q.1(b). The generating capacity of area A is 36000 MW and its regulating characteristic is 1.5% of capacity per 0.1 Hz. Area B has a generating capacity of 4000 MW and its regulating characteristics is 1% of capacity per 0.1 Hz. Find each area share of a 400MW disturbance (load increase) occurring in area B and the resulting tie-line flow. **(10 Marks)**

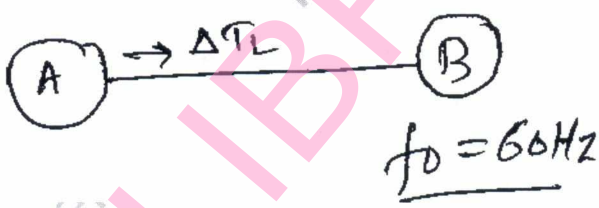

Fig.Q.1(b)

2 a. With a schematic diagram, explain the LFC loop and AVR loop of a generator:
LFC = load frequency control
AVR = automatic voltage regulator. **(08 Marks)**

b. Obtain the complete block diagram representation of load frequency control of an isolated power system. **(12 Marks)**

3 a. Obtain an expression for steady state change in system frequency Δf_{ss} for a step change in the load demand; assume free governor operation. **(12 Marks)**

b. A 100MVA alternator operating on rated load, uPF, at a frequency of 50Hz. The load is suddenly reduced to 50 MW. Due to time lag in the governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. Take H = 5 kW-sec/kVA of generator capacity. **(08 Marks)**

4 a. Show that the real power flow between two nodes in determined by the transmission angle 'δ' and the reactive power flow is determined by the scalar voltage difference between two nodes. **(08 Marks)**

b. Define voltage stability and voltage collapse. **(04 Marks)**

c. Three supply points A, B and C are connected to a common bus bar M. Supply point A is maintained at a nominal 275 kV and is connected to M through a 275/132 kV transformer (0.1 pu reactance) and a 132 kV line of 50Ω reactance. Supply point C is nominally at 275 kV and is connected to M by a 275/132 kV transformer (0.1 pu reactance) and a 132 kV line of 50Ω reactance. If at a particular system load, the line voltage at M falls below its nominal value by 5kV. Calculate the magnitude of the reactive volt-ampere injection required at M to re-establish the original voltage. The per unit values are expressed on 500MVA base and resistance may be neglected throughout. Refer Fig.Q.4(c). **(08 Marks)**

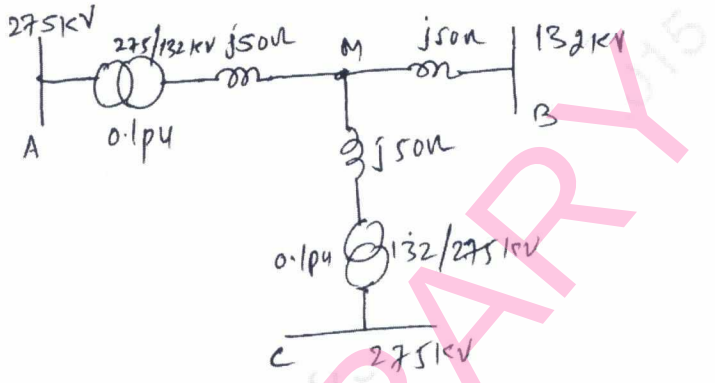

Fig.Q.4(c)

PART – B

5 a. Define unit commitment problem. **(04 Marks)**

b. Explain the dynamic programming (DP) method to solve unit commitment problem in a power system. **(10 Marks)**

c. Discuss the constraints in unit commitment for thermal plants. **(06 Marks)**

6 a. What do you understand by the term 'secured power system' and 'power system blackout'. **(06 Marks)**

b. Explain the security-constrained optimal power flow (SCOPF) function of power system security with an example. **(06 Marks)**

c. Explain contingency analysis using a suitable flow chart. **(08 Marks)**

7 a. Explain the weighted LSE (least squares estimation) method of power system state estimation. **(10 Marks)**

b. Explain: i) Suppression of bad data and ii) Identification of bad data in state estimation problem. **(10 Marks)**

8 a. Define reliability of a system. **(02 Marks)**

b. Explain the three modes of failure of a system. **(08 Marks)**

c. Obtain the expressions for steady-state reliability and general reliability function. **(10 Marks)**

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10EE836

Eighth Semester B.E. Degree Examination, June/July 2015
Renewable Energy Sources

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. What is meant by Renewable Energy Sources? Explain in brief these energy sources, with a special reference to the Indian context. **(10 Marks)**

b. What are the advantages and limitations of Renewable Energy Sources? Explain the prospects on Non – conventional Energy Sources in India. **(10 Marks)**

2 a. Define the following with respect to Solar radiation : i) Altitude Angle ii) Zenith Angle iii) Declination Angle iv) Hour Angle. **(06 Marks)**

b. Calculate the sunset hour angle and day length at location latitude of 35^0N on February 14^{th}. **(04 Marks)**

c. What is the difference between Pyrheliometer and Pyranometer? Describe the principle of Angstrom type pyrheliometer. **(10 Marks)**

3 a. Explain the principle of conversion of solar energy into heat. Explain with a neat diagram how this is employed in Flat plate collectors. **(10 Marks)**

b. State the advantages and disadvantages of concentrating collectors over Flat plate collectors. **(04 Marks)**

c. Classify solar energy storage systems. Describe in brief any one of the different storage systems. **(06 Marks)**

4 a. With a neat sketch, describe the construction and working of solar cooker. **(06 Marks)**

b. Explain the principle of solar photovoltaic power generation. What are the main elements of solar PV system? **(10 Marks)**

c. What are major advantages and disadvantages of solar PV system? **(04 Marks)**

PART - B

5 a. Classify the Wind Energy Conversion Systems. **(04 Marks)**

b. State and briefly explain the factors that determine the output power from wind energy. **(06 Marks)**

c. With usual notations, derive an expression for the maximum power output of horizontal axis wind turbine. **(10 Marks)**

6 a. Explain clearly the factors affecting the Biogas generation. **(10 Marks)**

b. With a neat diagram, explain the KVIC biogas plant. **(10 Marks)**

7 a. Discuss the basic principle of OTEC plants. Explain in brief the main types of OTEC systems. **(10 Marks)**

b. With a simple diagram, the working of a tidal power plant. **(06 Marks)**

c. List out the advantages and limitations of OTEC plants. **(04 Marks)**

8 Write short notes on :

a. Applications of wind energy.

b. Wave Energy.

c. Stand – alone solar PV system.

d. Small hydro resources. **(20 Marks)**

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10EE841

Eighth Semester B.E. Degree Examination, June/July 2015
Power System Dynamics and Stability

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. What is Stability? Explain types of stability. **(05 Marks)**
b. Explain the modeling of synchronous machine. **(15 Marks)**

2 a. Obtain stator voltage equations and the torque equations using Park's transformation. **(14 Marks)**
b. Obtain the relationship between T_d' and T_{do}''. **(06 Marks)**

3 a. With diagrams, explain the equivalent circuits of synchronous machine. **(10 Marks)**
b. Explain transient analysis of a synchronous machine when connected to a voltage source. **(10 Marks)**

4 a. What are different types of exciters? Explain IEEE type – 1 excitation system. **(07 Marks)**
b. Explain DC excitation system and obtain transfer function for separately excited DC generator. **(08 Marks)**
c. With block diagram, explain the static excitation system. **(05 Marks)**

PART – B

5 a. Explain steam turbine system. **(10 Marks)**
b. With the help of block diagrams, explain hydraulic speed governing system. **(10 Marks)**

6 a. Explain the load modeling by i) Polynomial representation ii) Exponential representation. **(10 Marks)**
b. Obtain the modeling of Single Machine Infinite Bus (SMIB). **(10 Marks)**

7 a. What are the requirements in the solution of differential Algebraic Equations (DAE)? **(05 Marks)**
b. Explain the numerical integration of differential equations. **(08 Marks)**
c. Explain partitioned solution for system equations. **(07 Marks)**

8 a. What are factors, which affects transient stability of power system? Explain. **(06 Marks)**
b. With block diagram, explain Discrete control of excitation systems. **(06 Marks)**
c. Explain the dynamic braking control of transient stability. **(08 Marks)**

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10EE847

Eighth Semester B.E. Degree Examination, June/July 2015
Electrical Power Quality

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Draw neat sketches wherever necessary.

PART – A

1 a. What are short duration voltage variations? Explain momentary interruption, sag and swell due to fault in a power system. **(10 Marks)**

b. Describe the five primary types of waveform distortion. **(10 Marks)**

2 a. Describe the use of ferroresonant constant voltage transformer for improvement in voltage sag. **(10 Marks)**

b. Discuss the severity of sag during full voltage starting of induction motor. **(10 Marks)**

3 a. Illustrate magnification of capacitor switching transients with the help of schematic and waveforms. **(10 Marks)**

b. What are inter harmonics? Describe the harmonic spectrum produced by a typical induction furnace. **(10 Marks)**

4 a. What is the nature of current drawn by a fluorescent lighting? Draw the frequency spectrum of the current and comment upon the spectrum. **(10 Marks)**

b. Discuss the impact of harmonics on shunt capacitor in a power system. **(10 Marks)**

PART – B

5 a. Discuss step wise procedure for performing power systems harmonic study. **(10 Marks)**

b. Explain the application of in line reactors or chokes for controlling harmonic distortion. **(10 Marks)**

6 a. Explain the power quality planning process with the help of a block diagram. **(10 Marks)**

b. Discuss power quality state estimation method for monitoring power quality. **(10 Marks)**

7 a. Explain the various power quality issues affected by distributed generation. **(10 Marks)**

b. Discuss various power quality issues in interconnection of generations. **(10 Marks)**

8 a. What are the various power quality measuring equipments? Discuss about the parameters which can be measured with these equipments. **(10 Marks)**

b. Illustrate basic design of an expert system for power quality monitoring application. **(10 Marks)**

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