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10EE81

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
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. Explain the purpose of estimation and costing. (06 Marks)
 b. Explain the functions of purchase department. (08 Marks)
 c. Explain different modes of tendering. (06 Marks)
- 2 a. What are the general rules governing for wiring of residential installation? (06 Marks)
 b. The Fig. Q2 (b) shows the plan of a low income group government quarters. Draw the single line diagram for lighting and heating circuits on the sketch. Calculate total load, length and size of the wire by taking safety factor of 2. (14 Marks)

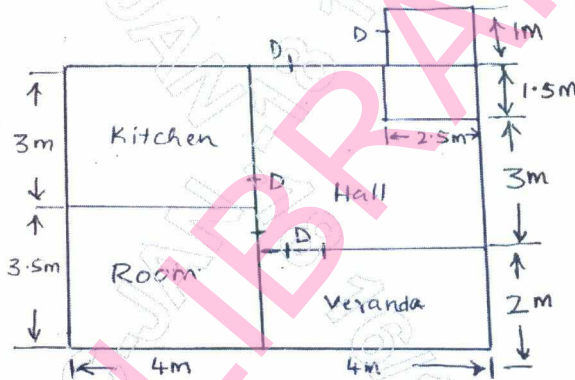


Fig. Q2 (b)

- 3 a. Explain the design considerations for electrical installation in commercial buildings. (06 Marks)
 b. Fig. Q3 (b) shows the ground floor plan of a newly constructed double storeyed school building. Show the arrangements of lamps, plug and sockets, fans in the installation plan. Estimate the quantity of the material required and the cost of electrical installation. The first floor having same plan as that of ground floor. (14 Marks)

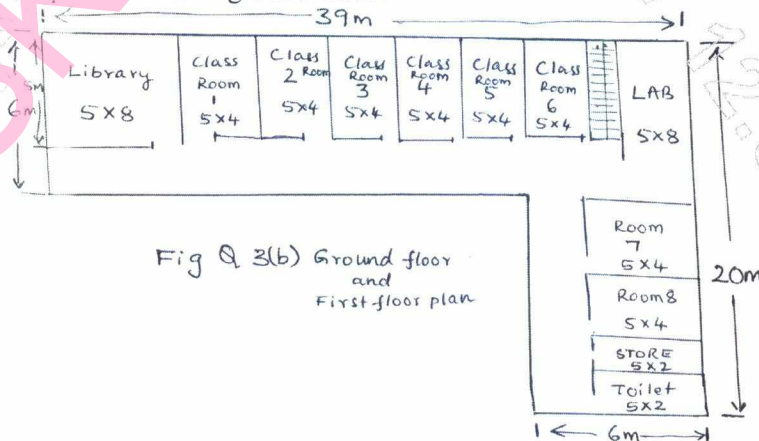


Fig Q 3(b) Ground floor and First-floor plan

Fig. Q3 (b)

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- 4 a. Explain the points to be checked while carrying out inspection of wiring installation. (06 Marks)
- b. Mention the types of tests conducted on wiring installations. Explain the insulation resistance test in detail. (07 Marks)
- c. Prepare a detailed estimate of cost for overhead service connection to feed power supply to a cashew factory of 10 HP load for a distance of 10 m. (07 Marks)

PART – B

- 5 a. Summarize the important considerations made for motor installation wiring. (08 Marks)
- b. A 10 HP 415 V, 3 phase, 50 Hz, squirrel cage induction motor is to be installed in a factory, the plan of which is shown in Fig. Q5 (b). Show the layout of the wiring and estimate the quantity of material required. The wiring is to be surface conduit. Assume efficiency of motor is 82% and power factor is 0.81 lagging. (12 Marks)

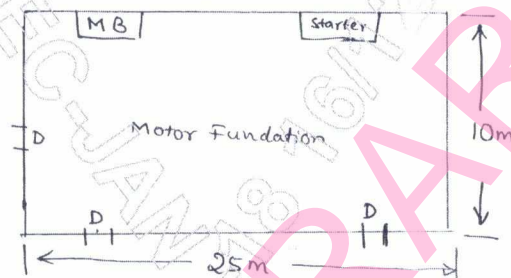


Fig. Q5 (b)

- 6 a. List the main components of overhead transmission lines. (08 Marks)
- b. A pole for an 11 KV, 3 phase, 50 Hz overhead line is situated on the bank of the road where there is no front and back for fixing the stay in the ground. This pole is to be earthed and a stay is to be provided. Prepare a list of material required and also the total cost estimation for erection. (12 Marks)
- 7 a. What are the points to be considered at the time of erection of overhead lines? (08 Marks)
- b. An overhead 11 kV, 50 Hz line has to be erected using 27 kg, 10 meter long steel poles and copper wire of size no. 3/2.642, with average span of 150 metres. Make a list of material required and estimate the cost per kilometer. (12 Marks)
- 8 a. Explain the classification of substation. (08 Marks)
- b. Estimate the quantity of material and cost for installation of 10 MVA, 33/11KV substation. Also draw the key diagram of the substation. (12 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Power System Operation & Control

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Discuss different states of power system with neat sketch. (05 Marks)
 b. Derive an expression for Tie-Line power and frequency deviation for two area system. (05 Marks)
 c. Two synchronous Generators are initially supplying a common load at 1.0 p.u and frequency of 50 Hz. The rating of unit 1 is 337 MW and has 0.03 p.u droop built into its governor unit 2 is rated at 420 MW and has 0.05 p.u. droop. Find each unit share of 10% increase in load demand. Also find new-value of Line frequency. Assume free governor action. (10 Marks)
- 2 a. For two generators operating in parallel deduce,

$$R_{\text{system}} = \frac{1}{\frac{P_1 \text{ rate}}{R_1} + \frac{P_2 \text{ rate}}{R_2}} \text{ 1 /MW}$$
 Where R_1 and R_2 are droop characteristics of Generator 1 and Generator 2. (08 Marks)
 b. With a neat block diagram, explain (i) Load model (ii) Generator model. (06 Marks)
 c. Explain (i) Automatic generator control (ii) Area control error. (06 Marks)
- 3 a. With a block diagram, list the functions of, (i) AVR (ii) ALFC loops. (05 Marks)
 b. Determine the primary ALFC loop parameters for control area having the following data:
 (i) Rated capacity of area = 2000 MW (ii) Frequency = 50 Hz
 (iii) Inertia constant = 5.0 (iv) Operating load (P_D) = 1000 MW (05 Marks)
 c. A single area consist of two generators with following parameters:
 Generator – 1 = 1200 MVA, $R = 6\%$ (on machine base)
 Generator – 2 = 1000 MVA, $R = 4\%$, (on machine base)
 The units are sharing 1800 MW at nominal frequency of 50 Hz. Unit-1 supplies 1000 MW and unit 2 supplies 800 MW. The system load is increased by 200 MW. Find (i) Steady state frequency and generation of each unit if $D = 0$. (ii) Repeat (i) if $D = 1.5$
 Assume a base of 2000 MVA. (10 Marks)
- 4 a. Explain different sources of reactive power generation and absorption of reactive power in a power system. (05 Marks)
 b. Deduce a equation relating voltage, power and reactive power at node. (05 Marks)
 c. A 220 KV, line has tap changing transformer at both ends. The transformer at sending end has a nominal ratio of 11/220 KV and that at receiving end 220/11 KV. The line impedance is $20 + j60\Omega$ and the load at the receiving end is 100 MVA , 0.8 $\gamma.f$ (lag). If the product of two off-nominal tap setting is 1, find the tap-setting to give 11 KV at load Bus. (10 Marks)

PART – B

- 5 a. Explain in detail constraints in unit commitment problems. (10 Marks)
 b. With a neat flow-chart, explain forward dynamic programming method of solving u.c. problem. (10 Marks)

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- 6 a. What is meant by power system security? Explain major functions involved in system security. What are the factors affecting system security? (10 Marks)
- b. With the help of flow-chart, explain contingency analysis. (10 Marks)
- 7 a. Explain 'Energy Management System'. (10 Marks)
- b. Derive the steady-state reliability expression and general reliability expression. (10 Marks)
- 8 Write short notes on : (any four)
- a. u.c. problem.
- b. Least square estimation.
- c. Spinning reserve.
- d. B-coefficients.
- e. Network sensitivity factors. (20 Marks)

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10EE836

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
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. Explain clearly Energy Consumption concern with Indian Energy Scenario. (10 Marks)
 b. Explain why it is necessary to develop non – conventional method of generating Electrical energy. (10 Marks)
- 2 a. Explain briefly about the Solar Radiation on Tilted Surfaces. (06 Marks)
 b. Define and explain the following terms with respect to Solar Radiation :
 i) Direct and Diffused Radiation ii) Declination iii) Solar Constant. (06 Marks)
 c. Calculate the angle made by beam radiation with the normal to a flat collector on December 1 at 9.00 AM. Solar time for location at $28^{\circ} 35'$ N. The collector is tilted at an angle of latitude plus 10° , with the horizontal and is pointing due south. (08 Marks)
- 3 a. What are the main components of a flat plat solar collector? (08 Marks)
 b. What is Solar Still? Explain working of a Solar still. (06 Marks)
 c. State the advantages and disadvantages of concentrating collectors over Flat plate collectors. (06 Marks)
- 4 a. Explain with a neat block diagram of a Photo – Voltaic system for Electrical Power Generation. (10 Marks)
 b. State the applications, advantages and limitations of Photovoltaic System. (10 Marks)

PART – B

- 5 a. What is the basic principle of Wind Energy Conversion System? Derive an expression for power in the wind. (10 Marks)
 b. Describe with a neat block diagram about the workings of a Wind Energy Conversion System (WECS) with their main components. (10 Marks)
- 6 a. Explain the process of Biogas Generation Technology. Explain briefly about the main factors affecting the production of biogas power generation system. (10 Marks)
 b. With a neat sketch, explain KVIC Biogas plant and write its advantages and limitations. (10 Marks)
- 7 a. Explain the Basic principle of Tidal Power Generation. (10 Marks)
 b. With a neat sketch, explain the working principle of Closed – Cycle Ocean Thermal Energy Conversion System. (10 Marks)
- 8 Explain with a neat block diagram of following Energy Conversion Systems with their advantages and disadvantages :
 a. Fuel cell. (10 Marks)
 b. Wave Energy Conversion system. (10 Marks)

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10EE842

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Energy Auditing and Demand Side Management

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Explain an approach to achieve lower specific energy consumption. (06 Marks)
 - b. Describe the different statutory public controls, which regulate the supply industry. (08 Marks)
 - c. Describes standards for electrical equipments. (06 Marks)

- 2
 - a. Develop a cashflow model for uniform series sinking fund method. (06 Marks)
 - b. What is depreciation? Explain declining balance method of depreciation. (06 Marks)
 - c. An electrical energy audit indicates the motor consumption is 4×10^6 kwh per year. By upgrading the motor spares with high efficiency motors, a 10% savings can be realized. The additional cost for these motors is estimated at Rs 80,000/-. Assuming an 8% per kwh energy charge and 20 year life, is the expenditure justified based on a minimum rate of return of 20% before taxes? Solve the problem using the present worth and annual cost methods. (08 Marks)

- 3
 - a. Write neatly a general format of energy audit report. (10 Marks)
 - b. Explain the audits required for creating energy profiles in an industry briefly. Discuss the energy audit instruments. (10 Marks)

- 4
 - a. Explain power flow concept with the help of a single line diagram. (06 Marks)
 - b. The load on the installation is 800kw, 0.8 lag which works for 3000hrs per annum. The tariff is Rs. 100/- per KVA plus 20 paise per kwh. If the power factor is improved to 0.9(lag) by means of loss free capacitors costing Rs. 60/- per KVAR. Calculate the annual saving affected. Allow 10% annum for interest and depreciation on capacitors. (08 Marks)
 - c. What are the effects of low power factor? (06 Marks)

PART – B

- 5
 - a. Obtain the condition for most economic power factor when KW demand is constant. (06 Marks)
 - b. A 3 phase, 50Hz, 400V motor develops 100HP(74.6 KW) the power factor being 0.75 lagging and efficiency 93%. A bank of capacitors is connected in delta across the supply terminals and power factor raised to 0.95 lag. Each of the capacitance units is built with 4 similar 100V capacitors. Determine the capacitance of each capacitor. (08 Marks)
 - c. Define : i) Plant energy performance
ii) Production factor
iii) Diversity factor
iv) Plant use factor. (06 Marks)

- 6 a. What are the objectives of tariff? What are the broad features of availability based tariff. (10 Marks)
- b. A factory has a maximum load of 240 KW at 0.8 pf. lagging with an annual consumption of 50,000 units. The tariff is Rs. 50 per KVA maximum demand plus 10 paise per unit. Calculate the flat rate of energy consumption what will be the annual saving if pf is raised to unity. (06 Marks)
- c. Write a short note on energy different motors. (04 Marks)
- 7 a. Explain the terms :
i) Peak clipping
ii) Valley filling
iii) Load shifting. (10 Marks)
- b. Explain the tariffs for demand side management. (10 Marks)
- 8 a. Explain multiplicity power exchange model. (10 Marks)
- b. Explain the types of uncertainties in DSM programs. (10 Marks)

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10EE847

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Electrical Power Quality

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define and explain the following terms :
 - i) Long duration voltage variation as per ANSIC 84.1 (04 Marks)
 - ii) Inter harmonics (04 Marks)
 - iii) Waveform distortion as per IEEE Std 519-1992 (04 Marks)
 - iv) CBEMA and ITI curve. (04 Marks)
- b. Explain power Quality Evaluation procedure. (04 Marks)
- 2 a. Explain step – wise procedure to estimate voltage sag performance in utility distribution system. (10 Marks)
- b. What are the fundamental principle of protection from voltage sags and interruptions? (10 Marks)
- 3 a. What is transient phenomenon? (02 Marks)
- b. What are the sources of transient overvoltage? Explain any one. (10 Marks)
- c. Explain principles of overvoltage protection. (08 Marks)
- 4 a. What are harmonics as per IEE Std 1159? (02 Marks)
- b. Explain the indices used to measure the harmonic content of a waveform. (10 Marks)
- c. How does DC drives and three phase power converter act as sources of harmonics in case of industrial loads? (08 Marks)

PART – B

- 5 a. Discuss some basic principles for controlling harmonics. (10 Marks)
- b. How are filters used to control harmonic distortion? (10 Marks)
- 6 a. Write short notes on :
 - i) Sag – Score (02 Marks)
 - ii) Voltage Sag Payment (03 Marks)
 - iii) System average RMS Frequency Index (SARFI) (05 Marks)
- b. Define with graphical representation various RMS voltage variations as per IEEE Std, 1159-19957. (10 Marks)
- 7 a. Explain on the production of voltage harmonics in synchronous machines. (10 Marks)
- b. Write short notes on :
 - i) IEEE Std 929 – 2000 (02 Marks)
 - ii) IEEE Std 1547 – 2003 (02 Marks)
- c. How are fuel cells used as a DG technology? (06 Marks)
- 8 a. What is Power Quality Monitoring? (02 Marks)
- b. Explain the procedure to assess power quality measurement data. (10 Marks)
- c. Discuss some future applications of intelligent power quality monitoring. (08 Marks)

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