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10EE81

Eighth Semester B.E. Degree Examination, June/July 2016
Electrical Design, Estimation and Costing

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define estimating and state its purpose. State the important factors which an estimator should know for preparing an internal wiring estimate. (08 Marks)
- b. Explain : (i) Contingencies (ii) Overhead charges and (iii) Profit. (06 Marks)
- c. Mention the different modes of tendering and explain them. (06 Marks)
- 2 a. Explain the sequence to be followed for preparing the estimate of residential wiring. (06 Marks)
- b. The accompanying sketch shows the plan of an officer's quarter. Its to be wired up as an AEH installation. The heating load is two outlets of 1kW each in the kitchen and one outlet of 2kW in the bath. The existing supply pole is 20 mtrs away from the house. Use conduit wiring system for the calculations.
 - i) Mention the type of service mains proposed
 - ii) Show the wiring plan in the sketch supplied
 - iii) Calculate the total load consumption
 - iv) Calculate the length of the wire
 - v) Calculate the length of conduit required. (14 Marks)

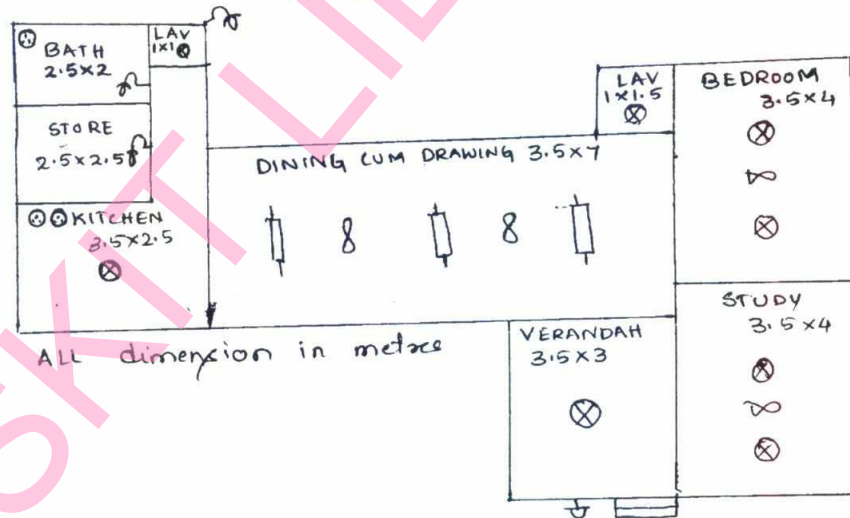


Fig. Q2 (b)

- 3 a. What is bus bar? Draw the diagram showing the arrangement of bus bar and switch fuse unit in a bus bar chamber. (04 Marks)
- b. An office hall 30m × 15m × 3m is to be illuminated by 40 nos twin 40 watts tube light fitting. Number of lamp fitted along the width and length are 4 and 10 respectively. Single phase 230V, 50Hz a.c supply is available at the centre of one of the 30m long wall. Assuming PVC conduit type of wiring calculate (i) Total connected load (ii) Number of sub-circuits (iii) Size of cable. iv) Ratings of switch board and Distribution board (v) Also show the wiring diagram of 1 sub-circuit. (16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

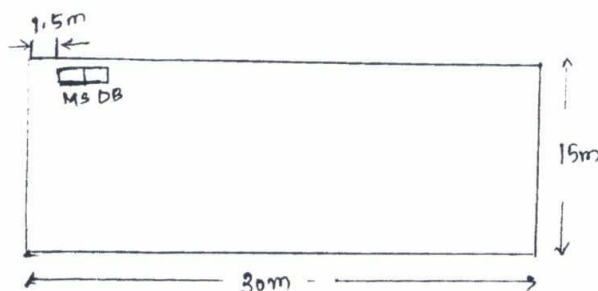


Fig. Q3(b)

- 4 a. Name the various tests required to be performed before connecting new installation to supply. Explain how is the polarity tested. (07 Marks)
- b. What are the methods of installation of service lines? Mention the various methods used for the installation of overhead lines. (06 Marks)
- c. A single storeyed house is to be provided with service connection from nearby pole situated 20 meters away from building receiving point. The supply is given at 1ϕ , 230V, 50Hz. Prepare list of material with specification. Assume total load connected in the house is 3200W. (07 Marks)

PART - B

- 5 a. Explain the determination of input power, size of conduit, distribution board, main switch and starter. (06 Marks)
- b. Two ac, 3phase, 415V, 50Hz squirrel cage motors are to be installed in a workshop. The rated outputs of the motors and their locations are as shown in the Fig. Q5(b) γ - Δ starters supplied with each motor are to be installed on the wall. The supply company's meter will be located at the position marked. The wiring of the machine is to be carried out according to IE rules. Make a neat sketch of the wiring scheme with the help of a single line diagram indicating on the wiring diagram the number and size of cables used. Prepare a list of material required for the wiring including the necessary earthings. Assuming efficiency 85% and $pf = 0.8$. (14 Marks)

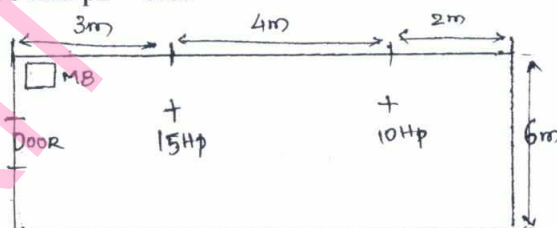


Fig. Q5(b)

- 6 a. Define feeder, distributor and service mains. (06 Marks)
- b. Estimate the quantity's of material required and cost of 1km of overhead 11kV 50Hz line using steel pole of 11meter height and ACSR conductor of $6/1 \times 2.59$ mm with an average span of 120m. (14 Marks)
- 7 a. Explain the procedure for the estimation of H.T lines for the distribution line. (08 Marks)
- b. Estimate the cost of LT lines extension from T.C to 3I.P sheds of 5Hp each at a distance of 500m from TC. Assume a span of 65M and 7.5M poles. (12 Marks)
- 8 a. What is the purpose of providing the substation earthings systems? (04 Marks)
- b. Estimate the quantity of material required for the augmentation of 33kV grid substation of 500KVA to 1000KVA, 33/11kV grid substation. (16 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
Power System Operation and Control

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain different operating states of a power system with the help of a block diagram. (08 Marks)
 b. Derive expression for frequency deviation Δf and tie line power flow ΔT_L in a two area inter connected power system. (08 Marks)
 c. What is an ECC? Mention its functions. (04 Marks)
- 2 a. With relevant characteristics, explain parallel operation of two generators with different capacity and regulation. (07 Marks)
 b. Draw the schematic of load frequency control and excitation voltage regulators of a generator and explain. (07 Marks)
 c. A synchronous generator rated 100MVA operates on full load at unity power factor with frequency 50Hz. The load is suddenly reduced to 50MW. Due to time lag in governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. Take $H = 5\text{kW-sec/KVA}$ of generator capacity. (06 Marks)
- 3 a. Explain with block diagram, the modeling of
 i) Speed governing system ii) Turbine iii) Generator and load. (10 Marks)
 b. With a block diagram representation, explain tie-line bias control of a two area load frequency control. (10 Marks)
- 4 a. List the components that absorb and generate reactive power in an electric system. (06 Marks)
 b. Fig. Q4(b) shows one line diagram of a power system with three supply points A, B and C connected to a common busbar M. If at a particular system load, the line voltage of 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 value. The pu values are expressed on a 500MVA base. (08 Marks)

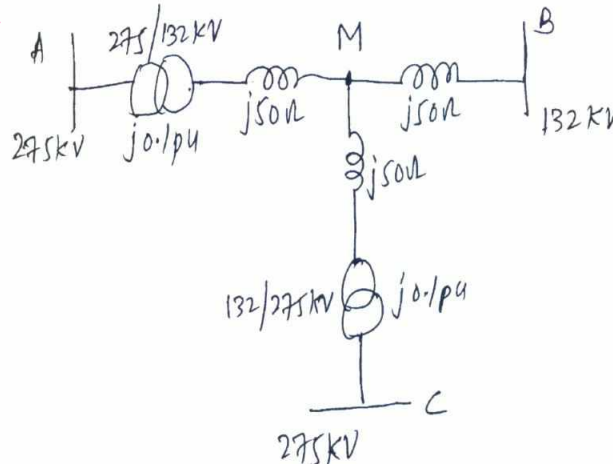


Fig. Q4(b)

- c. Define:
- i) Voltage stability
 - ii) Voltage collapse and
 - iii) Sub synchronous resonance.
- (06 Marks)

PART – B

- 5 a. Obtain the exact coordination equations for optimum loading of thermal power plants considering transmission losses. (06 Marks)
- b. With the help of a flow chart, explain the dynamic programming method in unit commitment solution. (10 Marks)
- c. Explain priority – list method for unit commitment problem with an example. (04 Marks)
- 6 a. Explain the factors affecting power system security. (06 Marks)
- b. Explain, with an example, the security constrained optimal power flow (SCOPF). (06 Marks)
- c. Explain contingency analysis, using a flow chart. (08 Marks)
- 7 a. What is energy management system? (04 Marks)
- b. Explain the weighted least squares estimation (WLSE) method of power system state estimation. (10 Marks)
- c. Explain :
- i) Difference between load flow problem and state estimation problem
 - ii) Suppression of bad data in state estimation problem. (06 Marks)
- 8 a. With a graph, explain the following :
- i) Early failure
 - ii) Wear out failure and
 - iii) Chance failure. (08 Marks)
- b. A system has three generating units, each of 50MW capacity. The forced outage rate (FOR) of each unit is 0.03. Find the total number of states and their probability of occurrence. (08 Marks)
- c. Write the possible states of a two unit system in a table form. (04 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016

Renewable Energy Sources

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. List the difference between renewable and nonrenewable energy sources. (08 Marks)
 b. What are the advantages and limitations of renewable energy sources? (06 Marks)
 c. Explain briefly the Indian Energy Scenario. (06 Marks)
- 2 a. What is difference between pyrheliometer and pyranometer? Describe the principle of Angstrom type pyrheliometer. (10 Marks)
 b. Define the terms: i) Altitude angle, ii) Zenith angle and iii) Declination angle. (06 Marks)
 c. Calculate the day length on a horizontal surface at New Delhi ($28^{\circ}35'N$, $77^{\circ}12'E$) on December 1st. (04 Marks)
- 3 a. With a neat diagram, explain the working principle of solar water heater. (06 Marks)
 b. State the advantages and disadvantages of concentrated collector over flat plate collector. (04 Marks)
 c. Classify the different methods of storing solar energy. Describe thermal energy storage systems. (10 Marks)
- 4 a. With a neat diagram, explain solar water pumping systems. (08 Marks)
 b. What are the major advantages and disadvantages of solar PV systems? (04 Marks)
 c. With the help of neat diagrams, describe the principle and working of central receiver system. (08 Marks)

PART – B

- 5 a. What is basic principle of wind energy conversion system? Classify the wind energy conversion system. (04 Marks)
 b. With a neat block diagram, explain the basic components of WECS. (08 Marks)
 c. With usual notations, derive an expression for the maximum power output of wind turbine. (08 Marks)
- 6 a. What are the factors affecting biogas generation? (04 Marks)
 b. With a neat diagram, explain KVIC biogas plant. (10 Marks)
 c. What are the advantages and disadvantages of floating drum type plant? (06 Marks)
- 7 a. Explain the working of single basin Tidal plant. (06 Marks)
 b. With a suitable diagram, explain the working of open cycle OTEC for ocean thermal energy. (10 Marks)
 c. What are the advantages and limitations of wave energy conversion systems? (04 Marks)
- 8 a. Describe the classification of fuel cell. With a neat sketch, explain the working of fuel cell. (08 Marks)
 b. Explain various methods of production of hydrogen for the use of energy carrier. (06 Marks)
 c. What are the advantages and disadvantages of small hydropower plants? (06 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
Energy Audit and Demand Side Management

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 energy conservation techniques used to reduce the energy costs. (06 Marks)
- b. With respect to supply system summarise the points in the distribution code. (08 Marks)
- c. Explain broad features of Indian electricity rules 1956. (06 Marks)
- 2 a. Explain payback analysis. Mention its advantages and disadvantages. (06 Marks)
- b. What is life cycle cost analysis? What are typical costs for a system and different ways to minimize costs? (06 Marks)
- c. The equipment in a power station costs Rs. 15, 60,000/- and has salvage value of Rs. 60,000/- at the end of 25 years. Determiner the depreciation value of the equipment at the end of 20 years by the following methods (i) straight line method (ii) Reducing balance method (iii) sinking fund method at 5% compounded annually. (08 Marks)
- 3 a. What are the energy management strategies? Explain them in brief. (08 Marks)
- b. What are energy audit instruments? Explain each one of them. (12 Marks)
- 4 a. With a vector diagram, explain various components of power triangle. (06 Marks)
- b. What is power flow concept? Define and explain plant energy performance and production factor. (06 Marks)
- c. Write short notes on :
(i) Primary and secondary distribution (ii) Advantages of energy audit. (08 Marks)

PART – B

- 5 a. Define power factor. What are the causes and disadvantages of low power factor? (12 Marks)
- b. Derive an expression for the most economical power factor. (08 Marks)
- 6 a. Write a note on energy efficient motors. (10 Marks)
- b. An industrial load operates at 0.75 p.f lag and has a monthly demand of 750kVA. The monthly power rate is Rs. 8.50 per kVA. To improve the power factor 200kVAR capacitors are installed in which there is negligible power loss. The installed cost of equipment is Rs. 20,000/- and fixed charges are estimated at 10% per year. Calculate the annual savings effected by the use of capacitors. (10 Marks)
- 7 a. Define and explain the concept of DSM. (06 Marks)
- b. What are the different benefits of DSM for supply industry, customers and society? (06 Marks)
- c. Briefly explain the DSM implementation issues. (08 Marks)
- 8 a. Explain energy conservation opportunities in agricultural sector, industrial sector and illumination system. (08 Marks)
- b. Discuss tariff options for DSM. Which tariffs promote DSM? (06 Marks)
- c. Explain: (i) Peak clipping (ii) valley filling (iii) Strategic energy conservation. (06 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
Electrical Power Quality

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain how power quality is equivalent to voltage quality? How the power quality evaluation is done in real time analysis. (06 Marks)
- b. With the sketch of a waveform, categories, typical values and typical voltage values, explain the types of waveform distortion and its causes. (10 Marks)
- c. Explain the significance of the following terms
i) CBEMA(ITI) curve ii) C rest factor iii) Islanding iv) Shielding (of utility lines) (04 Marks)
- 2 a. With a neat sketch and wave forms explain how the utility short circuit fault in one feeder effect the voltage levels in other parallel feeder. (10 Marks)
- b. Explain how the equipment sensitive to voltage sag effect in estimating voltage sag performance. (04 Marks)
- c. Explain the following equipment at a solution at the end user level for voltage sag.
i) Ferro resonant transformer ii) UPS system types. (06 Marks)
- 3 a. With a neat phasar diagram, explain five different type of voltage sag for different fault conditions and transformer connections. (10 Marks)
- b. Explain the important of fuse, C_B and auto recloses in utility system fault clearing issues. (10 Marks)
- 4 a. With a neat sketch explain how lighting surges effect at different points in the end user location. (10 Marks)
- b. Explain how rms voltage, current, active power and apparent power different between sinusoidal and non sinusoidal conditions. (10 Marks)

PART – B

- 5 a. Explain when the harmonic studies are performed and explain harmonic student procedure for mitigating harmonics. (10 Marks)
- b. Explain the computer tools used for harmonic analysis in harmonic studies. And where are the characteristics of computer software for harmonic analysis. (10 Marks)
- 6 a. Explain the full devices for controlling harmonic distortion (i) line reactors (ii) zig-zag transformer (10 Marks)
- b. Explain the variant passive fitters for controlling harmonic distortion. (10 Marks)
- 7 a. Explain the IEEE standards related to standards of harmonic. (10 Marks)
- b. What is power quality monitoring? Explain the common objectives of power quality monitoring. (10 Marks)
- 8 a. What are the important factors to be considered when selecting the instruments for measurement in power quality monitoring? (10 Marks)
- b. Explain the following equipment that are used for power quality monitoring :
i) multi-meter types ii) Harmonic analyzer/spectrum analyzer iii) Flicker meter. (10 Marks)

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