USN ☐☐☐☐☐☐☐☐☐☐   **10EE81**

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Electrical Design, Estimating and Costing

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
atleast TWO questions from each part.
2. Missing data may be assumed suitably.

Use the below data for wire size selection for all problems when required.

Wire Area (mm^2)	# and Diameter (mm)	Current Rating (Amperes)
1.0	1 / 1.12	05
2.5	3 / 1.06	15
4.0	7 / 0.737	20
6.0	7/1.06	28
10.0	7/1.40	43
25.0	19/1.12	74
50.0	19/1.83	160

Table – 1 : Wire Size Selection chart.

PART – A

1 a. State and explain any four IE Act rules that are most important. **(06 Marks)**
   b. State the purpose of an estimate and costing. **(06 Marks)**
   c. Briefly explain any four guidelines for tendering. **(08 Marks)**

2 a. Explain the main features of residential electrification. Explain the different circuits involved, the maximum rating of each circuit and how the number of sub-circuits are calculated. **(06 Marks)**
   b. Provide a detailed estimate for Hall shown in Fig.Q2(b). Show a neat single line diagram with all required equipments. Use buried conduit type of wiring. Provide a detailed list of materials and show the position of the lights, fans and switch boards. **(14 Marks)**
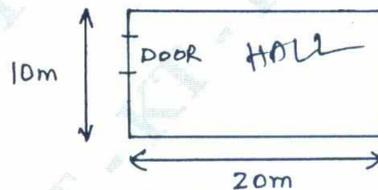

Fig.Q2(b)

3 a. Briefly explain the main differences between commercial and residential electrification. **(06 Marks)**
   b. A floor of a 3 story hostel is shown in Fig.Q3(b). Each room is required to have two lights and a 60 W fan. The Bathrooms have two heaters each. Calculate the total current, sub-circuits and show a neat single line diagram with the wiring connections. Clearly show the total power, no. of sub-circuits, cable size, position of the lights, fans and provide a list of materials. **(14 Marks)**
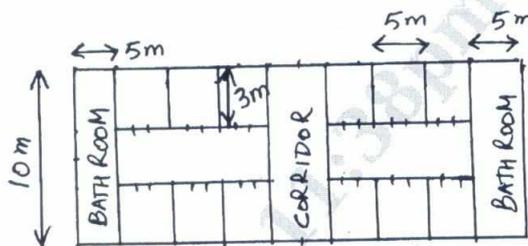
Fig.Q3(b)

4 a. Explain the two methods of testing insulation resistance. State the positions of the MCB, fuses, and other appliances during the test. **(06 Marks)**
  b. Explain what is a service connection and their types. **(06 Marks)**
  c. Estimate the installation of an underground service line to a building that requires 3 kW, 1ϕ. Draw a neat sketch showing all required materials. The service pole is 10 m away. **(08 Marks)**

PART – B

5 a. List out the important considerations regarding power circuit motor wiring. Draw a neat single line diagram neatly labeled. **(08 Marks)**
  b. Calculate the input power, current and estimate to complete the wiring of the workshop shown in Fig.Q5(b). Provide a neat circuit diagram and detailed list of materials. Use $\eta = 85\%$, pf = 85%. The motor is a 3ϕ, 415 V, 10 kW induction motor. **(12 Marks)**
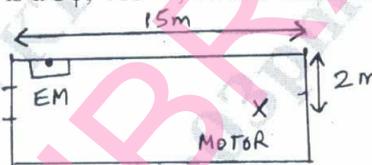

Fig.Q5(b)

6 a. Describe in detail all the parts of an overheard transmission tower. Draw a neat diagram neatly labeled. **(08 Marks)**
  b. A pole for OH 11 kV, 3-ϕ, 50 Hz line is required to be earthed and a star is to be provided. Make a neat sketch showing how it should be done. Prepare list of material required of same. **(12 Marks)**

7 a. Describe the testing and commissioning of overhead distribution lines. **(06 Marks)**
  b. An overhead distribution line of 415 V, 50 Hz is to be erected. Line length is 300m and end supports are terminated structures. The span between adjustment poles is 50m. Draw a neat sketch of the terminal pole with proper labels. Provide a list or all materials used. Use the following information: ϕ wires – 4 SWG Cu, Neutral 8 SWG Cu, Earth 8 SWG GI. **(14 Marks)**

8 a. Describe the different classifications of sub-stations and state the reasons for choosing them. **(08 Marks)**
  b. A 37 kW connection is to be given to a field at 415 V, 3ϕ, 50 Hz. The input is 11 kV overhead distribution line 20 m away. A pole mounted sub-station is to be used. The load is a motor with $\eta = 0.85$ and pf = 0.80. Make a detailed sketch with proper labels showing the arrangement of all required items and make a list of all items used. **(12 Marks)**

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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Power System Operation and Control

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. What is energy control center? Explain the functions of energy control center. **(06 Marks)**
   b. With block diagram, explain the digital computer configuration of the SCADA system.
   (07 Marks)
   c. Explain the parallel operation of generator with infinite bus. **(07 Marks)**

2 a. What is automatic voltage regulator? Obtain the mathematical modeling of exciter.
   (07 Marks)
   b. Two areas are interconnected. The generating capacity of A is 36,000 MW and its regulating characteristic is 1.5% of capacity/0.1 Hz. Area-D has a generating capacity of 40,000MW and its regulating characteristic is 1.0% of capacity/0.1Hz. Find each areas share of a +400 MW disturbance occurring in D and the resulting tie line flow. **(05 Marks)**
   c. Explain the static performance of the Automatic Voltage Regulator (AVR) loop. **(08 Marks)**

3 a. What is Automatic Load Frequency Control (ALFC)? Obtain the mathematical modeling to close the ALFC loop. **(06 Marks)**
   b. With block diagram, explain the static response of two area system. **(10 Marks)**
   c. Determine the primary ALFC loop parameters for a control area having the following data:
   Total rated area capacity P_r = 2000MW
   Normal operating load P_D^O = 1000MW
   Inertia constant H = 5.0sec
   Regulation R = 2.4Hz/pu MW
   Frequency f = 60 Hz.
   Take ∂P_D^O = 10MW and ∂f = 0.6 Hz. **(04 Marks)**

4 a. Derive an expression to relate voltage, power and reactive power at a node. **(06 Marks)**
   b. Explain the method of voltage control by
   i)   Shunt capacitor and reactor
   ii)   Synchronous compensator. **(07 Marks)**
   c. With PV diagram, explain the phenomina of voltage collapse. **(07 Marks)**

PART – B

5 a. What is unit commitment? Explain the constraints in solving the unit commitment problem.
   (10 Marks)
   b. With the help of flow chart, explain the dynamic programming technique. **(10 Marks)**

6 a. What is system security? Explain the security constrained optimal power flow. **(06 Marks)**
   b. With the help of flow chart, explain the contingency analysis. **(08 Marks)**
   c. Explain the DC load flow technique for contingency analysis. **(06 Marks)**

7 a. What is state estimation? Explain the power system state estimation. (10 Marks)
   b. Explain the least square technique. (10 Marks)

8 a. Define reliability. Explain the mode of failures in a system. (05 Marks)
   b. Derive the following reliability expression:
       i)   Reliability index.
       ii) Steady state reliability expression.
       iii) General reliability expression. (08 Marks)
   c. With flow chart, explain the loss of load probability. (07 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Energy Auditing and Demand Side Management

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Discuss the present energy scenario in India. **(06 Marks)**
   b. Explain the energy conservation techniques used to reduce energy costs. **(06 Marks)**
   c. Which are the issues addressed by the Energy Conservation Act. 2001? **(08 Marks)**

2 a. What is time value of money concept? What are the different cash flow models? **(08 Marks)**
   b. A motor drive consumes 40,000 units per annum. By upgrading to high efficiency spare parts the consumption can be reduced by 5%. The additional cost of upgradation is Rs.35,000. Assume energy charge of Rs.5 per unit and life of motors 15 years. Is the change justified? Take rate of interest/return = 20% use annual cost method. **(08 Marks)**
   c. What is depreciation and what are the causes of depreciation? **(04 Marks)**

3 a. Give the ten-step methodology for detailed energy audit and explain. **(10 Marks)**
   b. Write short note on energy audit instruments. **(10 Marks)**

4 a. With a layout diagram, explain the typical A.C. power supply scheme. **(10 Marks)**
   b. With a vector diagram, explain various components of power triangle. **(05 Marks)**
   c. What is Plant Energy Performance (PEP)? Define the production factor. **(05 Marks)**

PART – B

5 a. What are the disadvantages of low power factor? What are the different methods to improve the power factor? **(06 Marks)**
   b. A single phase induction motor takes a current of 20A at p.f. of 0.75 lagging from 230V, 50Hz supply. What value must a shunt condenser have to raise the p.f. to 0.95 lagging the load remaining same? **(08 Marks)**
   c. Write a note on energy efficiency motors. **(06 Marks)**

6 a. What is ABT? What are the broad features of ABT design? **(10 Marks)**
   b. The load on an installation is 800kW, 0.8p.f. lagging which works for 3000 hours per annum. The tariff is Rs.100 per KVA plus 20 paise per kWh. If the power factor (p.f.) is improved to 0.9 lagging by means of loss-free capacitors. Costing Rs.60 per KVAR. Calculate the annual saving effected. Allow 10% per annum for interest and depreciation on capacitors. **(10 Marks)**

7 a. With flow diagram explain briefly DSM planning and implementation. **(08 Marks)**
   b. What is Demand Side Management (DSM)? Mention the benefits of DSM. **(06 Marks)**
   c. Explain energy conservation opportunities in agriculture sector. **(06 Marks)**

8 a. Explain peak clipping, valley filling, load shedding and strategic energy conservation. **(10 Marks)**
   b. Discuss tariff options for DSM. Which tariffs promote DSM? **(10 Marks)**

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