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**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 at least 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 <sup>2</sup> )	# 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)

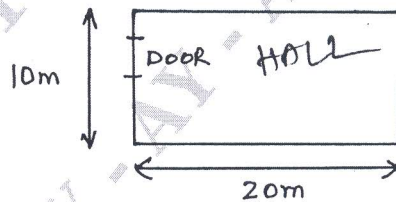


Fig.Q2(b)

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)

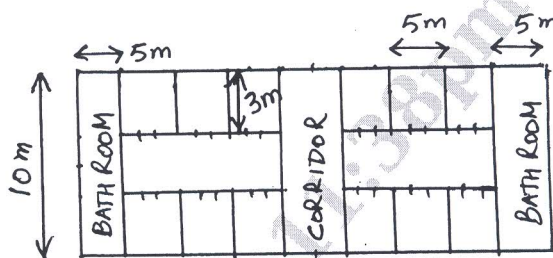


Fig. Q3(b)

- 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, 1 $\phi$ . 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  $\eta = 85\%$ ,  $\text{pf} = 85\%$ . The motor is a 3 $\phi$ , 415 V, 10 kW induction motor. (12 Marks)

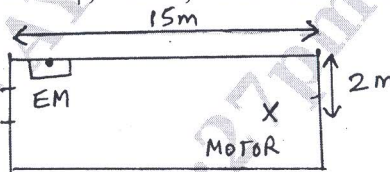


Fig. Q5(b)

- 6 a. Describe in detail all the parts of an overhead transmission tower. Draw a neat diagram neatly labeled. (08 Marks)
- b. A pole for OH 11 kV, 3- $\phi$ , 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:  $\phi$  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, 3 $\phi$ , 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  $\text{pf} = 0.80$ . 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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