

Ganpat University
M. Tech. Semester-II (Electrical Engineering)
Regular Examination May –June-2014
3EE206:- Power Quality & Energy Management

Time: 3 Hours

Total Marks:-70

- Instructions: - 1. Attempt all questions.
 2. Make suitable assumptions wherever necessary.
 3. Figures to the right indicate full marks.

SECTION-I

- Que-1 (A) Explain Net present value and Internal rate of return methods. [06]
 (B) Discuss different Energy Conservation method in industry. [06]
- OR**
- Que-1 (A) Explain the Payback period with its advantages. A co-generation plant installation is expected to reduce a company's annual energy bill by Rs.12 lakhs. If the capital cost of the new cogeneration installation is Rs.45 lakhs and the annual maintenance and operating costs are Rs. 3 lakhs, What will be the expected payback period for the project? [06]
 (B) Discuss the various steps for the implementation of energy management in an organization. [06]
- Que- 2 (A) Discuss ten step methodology for energy audit. [06]
 (B) Explain following energy efficient equipment. [05]
 (i) Maximum demand Controller (ii) energy efficient motor.
- OR**
- Que- 2 (A) Explain the different instruments required for an Energy audit. [06]
 (B) Explain 'Demand side management' and state its features. [05]
- Que-3 **Attempt following question.** [12]
 (A) Explain following terms related to power quality with figure.
 (1) Grounding (2) Noise (3) Notch (4) Voltage swell.
 (B) Discuss the treatment criteria, power quality weak link and interdependence with respect to power quality.

SECTION-II

- Que-4 (A) Explain various loads which are responsible for introduction of harmonics in the system. [06]
 (B) Explain the system frequency response characteristics under the presence of harmonics. [06]
- OR**
- Que-4 (A) Determine the current rating factor for a 300-kcmil copper conductor required to carry a nonlinear load with the following harmonic frequency content Fundamental = 250 A, 3rd harmonic = 25 A, 5th harmonic = 60 A, 7th harmonic = 45 A, 11th harmonic = 20 A. Assume fundamental frequency is 50Hz. Table.1. Containing values of X and K are available from cable manufacturers. Take 0.0636 is a constant for copper conductors. The magnetic permeability of a nonmagnetic material such as copper is approximately equal to 1.0. The DC resistance of 300-kcmil cable = 0.176 per mile. [06]

| X | K |
|-------|--------|
| 1.09 | 1.0075 |
| 1.889 | 1.0644 |
| 2.43 | 1.1520 |
| 2.88 | 1.2864 |
| 3.61 | 1.5287 |

Table:1: Cable Skin Effect Factor

- (B) Discuss the different type of harmonic filters. [06]

- Que- 5 (A) What are the different voltage sag mitigation techniques? Explain any two in detail. [06]
(B) Write the short note on power system transient model with figure. [05]

OR

- Que- 5 (A) What are CBEMA and ITIC graphs? Draw and discuss the ITIC graph in detail. [06]
(B) What are the various instruments used for power quality measurements? [05]

Que-6 Attempt following Questions. [12]

- (A) Define, displacement power factor and Distortion power factor .List the methods of Reactive power Compensation techniques and explain the Static power capacitor method for reactive power compensation.
(B) Discuss "switching of loads" and "lightning discharge" as causes of Transients.

END OF PAPER
Best of Luck