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Total Number of Pages:2

M.TECH
SUB_CODE:EEPE104

1st Semester Regular / Back Examination 2015-16
SUBJECT NAME: Power Quality (Power Systems Engineering)
BRANCH: Electrical Engineering
Time: 3 Hours
Max marks: 70
Q.CODE: T1226

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1** Answer the following questions: **(2 x 10)**
- a) Define power quality as per IEEE standards.
 - b) What are the commonly used terms that describe the parameters of electrical power that describe or measure power quality?
 - c) What is the most common power quality problem?
 - d) What is the second most common power quality problem?
 - e) What type of equipment is affected by power quality issues?
 - f) What are the types of power quality solutions available on the market today.
 - g) How can power quality problems be detected?
 - h) What are Electrical power harmonics?
 - i) How do harmonics affect the electrical system.
 - j) Why is power conditioning needed?
- Q2** a) What is interruption and what are the causes of it? **(5)**
b) Describe briefly distribution system reliability analysis? **(5)**
- Q3** a) A distribution company operates 10000 distribution transformers. Over a period of 15 years, 200 of these transformers fail for various reasons. A small fraction of them can be repaired, but most failures require replacement with a spare transformer. 200 failures give a total of 9250 hours. **(5)**
Find out
(i) Failure rate
(ii) Repair rate
(iii) Expected time to failure
- b) What is voltage sag and what are the causes of it? **(5)**
- Q4** a) What are the costs associated with interruption? **(10)**
b) Explain operation of adjustable speed DC drives?
- Q5** a) What are the mitigation methods for adjustable speed AC drives? **(5)**
b) How computers and consumer electronics are sensitive to voltage sag? **(5)**
- Q6** a) How power electronics loads contribute to voltage sag? **(5)**

- b)** Describe operation of voltage source converter? **(5)**
- Q7 a)** Howt various factors are affecting the sag magnitude due to faults at a certain point in the system? **(5)**
- b)** Explain the three levels of possible solutions to voltage sag and momentary interruption problems. **(5)**
- Q8** Write short notes on any two: **(5 x 2)**
- a)** Harmonics in Power line
 - b)** Combined shunt and series controller
 - c)** Synchronous motor sensitive to voltage sag
 - d)** Power quality monitoring