Register Number:………….…

M.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

POWER ELECTRONICS AND DRIVES

P14PETE08: Power Quality

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.   Which of the following generates harmonics   1) Resistance type Fan regulator   2) Induction   [K$_3$]
     Motor   3) Triac type Fan regulator   4)Laptops
     a)   1,3,4   b)   1,2
     c)   3,4   d)   2,3

2.   For short duration variations the time range varies between   [K$_1$]
     a)   Greater than 0.5 cycles, less than 60   b)   Greater than 1 cycle, less than 120 seconds
          seconds
     c)   Greater than 5 cycle, less than 300   d)   Greater than 10 cycle, less than 300
          seconds   seconds

3.   Voltage sag according to IEEE falls in the range of _____ of RMS voltage   [K$_1$]
     a)   10 to 90 %   b)   20 to 80 %
     c)   5 to 95 %   d)   2 to 98%

4.   Match the type of events with its types   [K$_1$]

Event	Type
A. Short duration variation	1. Impulsive and Oscillatory
B. Long duration variation	2. Sag
C. Waveform distortion	3. Under voltage
D. Transients	4. Notching

	A	B	C	D
a)	2	3	4	1
b)	3	2	1	4
c)	1	2	3	4
d)	3	1	4	2

5. Assertion: A--- Shunt active power filter compensates for harmonic current drawn by non linear loads [K₂]

   Reason: R---Shunt active filters are connected in series with the loads

   a) both A and R are individually true and R is the correct explanation of A
   b) both A and R are individually true but R is not the correct explanation of A

   c) A is true but R is false
   d) A is false but R is true

6. The frequency of 3ʳᵈ harmonic current for a 50 Hz source is [K₂]

   a) 200 Hz
   b) 150 Hz

   c) 50 Hz
   d) 100 Hz

7. Which of the following is used to mitigate the voltage sag. 1. DVR 2. DSTATCOM 3. Surge arrester [K₂]

   a) 1,2
   b) 1,2,3

   c) 3,2
   d) 2,3

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9. A 3 phase 6 pulse converter produces _____ and _____ harmonics [K₂]
   1) 5ᵗʰ   2) 7ᵗʰ   3) 6ᵗʰ   4) 12ᵗʰ

   a) 1,3,4
   b) 1,2

   c) 3,4
   d) 2,3

10. Arrange the following in the order which best suits for filtering harmonic currents. [K₂]
    1. Active Filter   2. Series Reactor   3. Tuned Filter

    a) 1-2-3
    b) 2-1-3

    c) 1-3-2
    d) 3-2-1

PART B (10 x 2 = 20 Marks)

11. What is the condition for interruption occurring and list its types? [K₂]

12. What are the causes of Voltage sag and give its impacts? [K₂]

13. Name the frequently used voltage sag indices. [K₁]

14. What is Ferro resonance and what are the problems associated with it? [K₁]

15. What is the need for low pass filter and power conditioners in transient protection? [K₂]

16. Give the advantages of metal oxide arresters and transmission line surge arresters [K₂]

17. What is condition used for identification of harmonic sources for two source systems? [K₂]

18. Define lightning phenomena and what is the range of current induced due to lightning stroke? [K$_2$]

19. Define long duration and short duration variations. [K$_2$]

20. Distinguish between THD and TDD [K$_1$]

PART C (10 x 5 = 50 Marks)

21. Give the classification of power quality problems [K$_1$]

22. Explain the following related with the power quality(i) Notching (ii) Inter harmonics [K$_2$]

23. Discuss the causes and types of transients. [K$_2$]

24. A 14.4 KV 3 phase system serves a distribution line with an impedance of 1.2+j6 ohms. If the voltage at sending end remains 14.4 KV, what is the voltage drop in the line due to a balanced 3 phase load of 10+j5 ohms per phase? Load impedance Z_L=10+j5 ohms; Line Impedance Z_{line}= 1.2+j6 ohms. Calculate the percentage Voltage Sag. [K$_3$]

25. Explain how Solid State transfer switch is used to mitigate voltage sag [K$_2$]

26. Explain the operation of DVR used for sag mitigation [K$_2$]

27. Explain the following Power quality monitoring equipments: Spectrum and harmonic analyzers [K$_2$]

28. Describe about the utility system protection against lightning. [K$_1$]

29. Explain in detail about the protection of underground cable against over voltages [K$_1$]

30. Explain the procedure for locating harmonics [K$_2$]

PART D (2 x 10 = 20 Marks)

31. Discuss about the CBEMA curves and explain about the events described in the curve. [K$_2$]

32. Discuss about the sources of harmonics from the commercial loads, industrial loads and residential loads. [K$_2$]

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