BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: PG **SEMESTER: 2nd**

BRANCH: EEE (MESRA) **SESSION: SP22**

SUBJECT: EE 633 Power Quality

TIME: 2Hrs **FULL MARKS:50**

INSTRUCTIONS:
1. The question paper contains Two (2) sections. Section A comprises 30 Marks, and Section B consists of 20 marks.
2. Both Section A and Section B are compulsory.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data handbook/Graph paper etc., to be supplied to the candidates in the examination hall.

SECTION (A)

Answer all questions

Q1. Explain the differences between failure, outage and interruptions. **[3]**

Q2 What are the different sources of transient of over voltages? Discuss the capacitor switching transient. **[3]**

Q3 Differentiate ripple and harmonics. **[3]**

Q4 Voltage sag and interruption are very similar in nature. Justify the statement. **[3]**

Q5 Find the harmonic distortion of a voltage with following harmonic components: **[3]**
Fundamental=114V
3rd harmonic=4V
5th harmonic=27V
7th harmonic=1.5V
9th harmonic=1V

Q6 What is the objective of obtaining frequency response? What information is extracted from frequency response of a system. **[3]**

Q7 Explain the power quality issue due capacitor switching in the power system. In which scenario the overvoltage may go beyond 2 p.u? **[3]**

Q8 What is the sideband frequency presents in a PWM switched converters if the career frequency is 21 times of the fundamental frequency? **[3]**

Q9. What is common mode voltage in a PWM switching based 3 phase converters? **[3]**

Q10 Give the phase sequence of a 5^{th} and 7^{th} harmonics component in a 3-phase system. **[3]**

SECTION (B)
Answer any five questions

Q1	Where are the voltage harmonics are more dominant between transmission system and distribution? Justify your answer in two sentences.	**[4]**
Q2	What is the difference between THD and TDD? At different current level how THD and TDD varies?	**[4]**
Q3	Roughly draw and explain the bode plot of both magnitude and phase for low pass, high pass and band pass filter.	**[4]**
Q4	Explain the working of PLL with clear control diagram.	**[4]**
Q5	What is decoupled control philosophy? Please explain in terms of close loop control of VSC.	**[4]**
Q6	Explain the control philosophy of a STATCOM. Give the operating region of a STATCOM combined with TSC and TCR in a V-I plane.	**[4]**
Q7	What is SSSC. Explain its use with clear operating region in a V-I plane.	**[4]**