R22 Regulation *Subject code:4P7BD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Regular Examinations, November 2025

POWER QUALITY & FACTS

(EEE)

Maximum Marks: 60 Date: 28.11.2025 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BloomTx
1.a)	Define power quality.	1M	1	1
b)	What are the common sources of voltage sag in a distribution system?	1M	1	1
c)	List any two causes of harmonics in power systems.	1M	2	1
d)	What is the function of a shunt compensator?	1M	2	1
e)	Mention the purpose of a Static VAR Compensator (SVC).	1M	3	2
f)	What is the difference between TCR and TSC in an SVC?	1M	3	1
g)	State the objective of a series compensator.	1M	4	1
h)	Define the function of a TCSC.	1M	4	1
i)	What is a Unified Power Flow Controller (UPFC)?	1M	5	1
j)	Mention any two advantages of UPFC in transmission systems.	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BloomTx
2	a) Explain various power quality problems in distribution systems with suitable examples. b) Discuss the effects of voltage sag and swell on sensitive loads.	5M 5M	1	2 2
	OR			
3	a) Describe waveform distortions in detail. b) Explain the concept and measurement of flicker.	5M 5M	1	3 2
4	a) Explain the need and principle of reactive power compensation in transmission lines. b) Compare shunt and series compensation at the midpoint of an AC line.	5M 5M	2	2 2
	OR			
5	a) Derive the expression for power transfer in an uncompensated AC transmission line. b) Discuss the advantages and limitations of passive reactive compensation.	5M 5M	2	4 3

6	a) With a neat diagram, explain the working of a Static VAR Compensator (SVC). b) Describe the control approaches used in STATCOM.	5M 5M	3	2 4
	OR			
7	a) Compare SVC and STATCOM in terms of operating principle and performance. b) Explain the operation of FC-TCR configuration.	5M 5M	3	2 4
8	a) Explain the operating principle and control of TCSC. b) Discuss the capability of SSSC to provide reactive power compensation.	5M 5M	4	2 4
	OR			
9	a) Illustrate the control range and VAR rating of SSSC with necessary characteristics. b) Describe the operating principle of TSSC.	5M 5M	4	5 2
10	a) Explain the structure and operating principle of Unified Power Flow Controller. b) Discuss how UPFC provides independent control of real and reactive power.	5M 5M	5	4 2
	OR			
11	a) Describe the conventional control capabilities of UPFC. b) Explain the applications of combined compensators in modern power systems.	5M 5M	5	2 2