

**Bachelor of Engineering (Electrical Engineering) - Fifth Year**

**(1<sup>st</sup> / 2<sup>nd</sup> Semester/Repeat/Supplementary/Annual/Bi-Annual)**

**SUBJECT: - CONDITION MONITORING OF ELECTRICAL SYSTEMS**

Full Marks 100

Time: ~~Two hours~~/Three hours/ ~~Four hours~~/Six hours

(50 marks for each part)

**Use Separate Answer scripts for each Part**

Part I

Answer any five

- |      |   |     |
|------|---|-----|
| Q 1. | How "Condition Monitoring" differs from protection? Why "Condition Monitoring" is essential for large machines?           | 10  |
| Q 2. | Discuss : How machine specification is related to machine failure?  | 10  |
| Q 3. | Discuss in brief what is "thermal aging" of electrical machines and what are its effects?                                 | 10  |
| Q 4. | Write short notes on (any two)<br>a) Surface Tracking and Moisture absorption<br>b) Thermal aging<br>c) Partial discharge | 5x2 |
| Q 5. | Discuss in brief:<br>a) Stator winding coolant system faults<br>b) Stator end-winding faults                              | 5x2 |
| Q 6. | Discuss in brief, the different courses of maintenance actions and their relative advantages and disadvantages?           | 10  |
| Q 7. | Define the following terms :<br><b>FMEA; TBF; MTBF; TTF; TTR</b>  | 5x2 |

**BACHELOR OF ENGINEERING**  
**IN ELECTRICAL ENGINEERING (EVENING) EXAMINATION, 2019**  
 (5th Year, 1st Semester)  
**CONDITION MONITORING OF ELECTRICAL SYSTEMS**

Time: Three Hours

Full Marks: 100

(50 marks for each part)

Use a **separate** Answer-script for each Part**PART-II**Answer *any three* questions*Two marks* are reserved for neat and well organized answer script

1. a) Describe a typical test arrangement to measure the insulation resistance of an equipment. 5
- b) Draw and explain the curve showing the components of current measured during DC testing of insulation. 5
- c) Briefly describe the effect of humidity and temperature on the measurement of insulation resistance. 4
- d) Why DC test setup is preferable as compared to AC test setup for measurement of insulation resistance? 2
  
2. a) Briefly describe the theory of frequency domain spectroscopy (FDS). Explain the process of (FDS) measurement with the help of a schematic. 11
- b) Discuss the advantages and disadvantages of dielectric response measurements in time-domain and in frequency-domain 5
  
3. a) Briefly describe the method of measurement of degree of polymerization (DP) by viscometric method and also mention the sources of error in this measurement. 9
- b) Write a note on "Duval's Triangle" highlighting some typical fault classification. 7
  
4. a) Describe with the help of a schematic how polarization and depolarization current (PDC) measurement can be performed on transformers. 9
- b) What is recovery voltage measurement? Explain the concept of recovery voltage spectra and central time constant. 7
- 5.a) How the monitoring of switchgears is done? What are the monitored parameters? 8
- b) Describe the recent development in the switchgear expert monitoring system highlighting the data collected. 8