Manmohan Technical University Office of the Controller of Examinations **Exam Year: 2082, Mangsir(Model Question)**	**Exam Roll:** …… Exam Roll in words: ……	
School: SOE	Level: BE	Invigilator's Sign: ……..
Program: BEEE	Year/Part: IV/I	Superintendent's Sign: ……
Subject: High Voltage Engineering (EG712EX)		Code No. ……

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i. Answers should be given by filling the Multiple-Choice Questions' Answer Sheet.
ii. The main answer sheet can be used for rough work.

Code No. ____

GROUP A *(Multiple-Choice Questions)*	**[10x1=10]**	**Time: 20 Minutes**

1)Which of the following electrical voltage levels are used for commercial HVAC electrical power transmission systems:
a) 132KV b) 220 KV c) 400KV **d) all of the above**

2)Which of the following overvoltage condition is considered as the most fatal for HV electrical power transmission systems:
a) **External overvoltages** b) Internal Overvoltages c) Both (a) & (b d) None of the above

3) In HV electrical power transmission systems, which of the following is a pre -condition for causing internal over voltages:
a) Switching surges b) Insulation failure c) Arcing grounds d) **All of the above**

4) Which of the following are the objectives of insulation coordination in HV systems:
a) To identify the over voltages in the HV system b) To select suitable insulation for the HVE equipments
c) **both a & b** d) None of the above

5) Performance of which of the following gets adversely affected by the vicinity of high stress electric fields:
a) Communication systems b) Pipelines c) Railway tracks d) **All of the above**

6) The phenomenon of 'chemical breakdown' is prominently observed in which of the following dielectric materials:
a) Gaseous dielectrics b) **Liquid dielectrics** c) Solid insulators d) All of the above

7)The phenomenon of 'Treeing' & 'Tracking' is observed in which of the following dielectric materials:
a) Gaseous dielectrics b) Liquid dielectrics c) **Solid insulators** d) None of the above

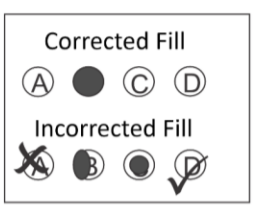
8)) What are the chief objectives of the non-destructive testing of HV insulators :
a) To verify the insulation quality & its dielectric strength b) Compliance with the International safety standards
c) **both a & b** d) None of the above

9)Which of the following is used as a dielectric material for HVE applications:
a) SF_6 b) Mineral Oil c) XLPE d) **All of the above**

10)Which of the following IEC international safety standards are followed for high voltage testing of HV Switch gear:
a) IEC-60950 b) IEC-60060 c) **IEC 62271** d) IEC-60076

Multiple Choice Questions' Answer Sheet

Marks Secured: _____
In Words: _____
Examiner's Sign: _____ Date: _____
Scrutinizer's Marks: _____
In Words: _____
Scrutinizer's Sign: _____ Date: _____



1.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
2.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

Manmohan Technical University
Office of the Controller of Examinations
Exam Year: 2082, Mangsir(Model Question

School: SOE	Level: BE	Time: 3 Hours
Program: BEEE	Year/Part: IV/I	Full Marks: 50
Subject: **High Voltage Engineering (EG712EX)**		

- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

GROUP A *(Multiple-Choice Questions in separate paper)* **[10×1=10]**

GROUP B ***(****Short Answer Questions - **Attempt Any Eight)*** **[8×2=16]**

1)Write any four major differences between HVAC & HVDC power cables.
2) Discuss in brief different categories of "Over voltages" occurring in a power system network?
3)Explain briefly various protection techniques used for HV electric power transmission lines and substations against lightning over voltages?
4) Discuss what do you understand by insulation coordination?
5) Explain the influence of high stress electromagnetic fields on electronic communication systems.
6)How are"Arcing Grounds" responsible for causing internal over voltages in HV power transmission systems?
7)a) Calculate the breakdown strength of air for a gap of **1 mm** under uniform field conditions and standard atmospheric conditions.
b) Explain the phenomenon of dielectric heating of solid insulators under the influence of AC fields.
8) Explain the mechanism of partial breakdown in dielectric materials?
9) Enlist the various techniques employed for the measurement of HVAC, HVDC and Impulse voltages

GROUP C ***(Long** Answer Questions - **Attempt Any Six)*** **[6×4=24]**

10. a) Why are FACTS devices used in AC power transmission systems? Discuss different categories of FACTS devices.
b) Using a neat & labelled diagram, describe in brief the main components of a High Tension (HV) cable.

11. A surge of 3000kV is travelling along a 132kV line. The line surge impedance is 300 ohms and the protective level is 1700 kV. Determine (i) current through the arrester (ii) the value of the arrester resistance for this condition (iii) current and voltage reflection and refraction coefficients (iv) Optimal current rating of the arrester

12. Define the term "Over voltage" in a power system network. How over voltage can be detrimental to the overall health of power system components? Discuss any four reasons of occurrence of "internal over voltages ".

13. What do you mean by "external over voltages "in electric power system network? List down the chief causes of occurrence of "external over voltages ". Why external voltages are considered to be more destructive? Give reasons.

14. Explain how Insulation coordination is used for HV power transformers & HV transmission lines?

15. In an experiment on a certain gas it was found that the steady state current is 5.5×10^{-8} Amperes at 8kV at a distance of 0.4 cm between the plane electrodes.Keeping the field cconstant and reducing the distance to 0.1 cm results in a current of 5.5×10^{-9} A. Calculate Townsend's primary ionization coefficient α

16) A square insulation disc of 154 mm thick and relative permittivity of 10 has an internal void of 0.1 mm square thickness of dielectric strength of 46 kV/cm. Check whether the internal discharge will occur or not if 40kV applied across insulator. (Assume air dielectric strength of 30 kV/cm (peak).

THE END