Total number of printed pages:02 **Programme D/6th /DEE611**

2023

SUBSTATION, SWITCHGEAR AND PROTECTION

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Mention four desirable characteristics of fuse element.	4
	b)	Define current rating and fusing current of fuse element.	2+2=4
	c)	Mention two important advantages and two disadvantages of fuse elements	2+2=4
	d)	A current of 2A is flowing through a conducting path of effective resistance 10Ω, for 10 seconds. Find the heat produced.	2
	e)	Write briefly on the methods of neutral grounding	6
2.	a)	What do you understand by overload and short-circuit? How will you protect a circuit against these faults? Explain with diagrams.	4+4=8
	b)	Explain with a neat diagram, how a protective relay is connected with current transformer and trip circuit for the protection of a line.	6
	c)	How the power system is divided in different protection zones to ensure efficient protection ? Explain with diagram.	6
3.	a)	Derive an expression for the torque develops in an induction relay.	6
	b)	Define the following- Instantaneous relay, inverse time relay, pick up current and current setting of relay	1×4=4
	c)	Write about the primary and back up protection systems.	2.5+2.5=5
	d)	Write briefly about the classification of power system relays.	5
4.	a)	How will you define a circuit breaker ?	5
	b)	How circuit breakers are classified ? (only names)	4
	c)	Write some important advantages of sulphur hexafluoride (SF_6) circuit	5

		breaker.	
	d)	Briefly write the high resistance method of arc extinction in circuit breaker.	6
5.	a)	What are the major equipment required in a transformer sub-station ?	4
	b)	Write briefly about the single and double bus bar arrangements in sub-stations.	4×2=8
	c)	Draw the symbols for the following- CT, PT, lightning arrestor (active gap), arcing horn	1×4=4
	d)	Write the SI units of the following- Torque, heat, active power, reactive power	1×4=4
6.	a)	What are the different types of faults that may occur in a transformer ?	2×3=6
	b)	Write the full form of the following- MCB, MCCB, ELCB, RCCB	1×4=4
	c)	Write about the following- (i) Thermal overload protection and (ii) Overvoltage protection of motors	5+5=10