Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2019

Subject Name: Power System Protection

Subject Code: 4TE07PSP1 Branch: B.Tech (Electrical)

Semester : 7 Date : 20/11/2019 Time : 10:30 To 01:30 Marks : 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

1) Give any two causes of fault in transmission lines.
2) Give any two methods of back up protection.
3) Give only the types of relay test.
4) Give the types of test performed on current transformer (CT).
5) Draw inverse, very inverse and extremely inverse characterisitcs for overcurrent relay.
6) The electromagnetic relay operation occurs when operating torque becomes greater than restraining torque. Determine whether the given statement is TRUE or FALSE.
7) Which type of relay is used for overload protection in an induction motor?
8) _____ protection is most popular for transmission lines.
9) _____ relay is a gas operated relay.
10) In_____(unit/nonunit) protection, relay operates only for internal faults
11) Which type of transformers are used above 66 KV system?
12) If a relay operates for a fault beyond its protected distance, relay is said to be_____ (overreach/underreach).
13) If a burden on the CT increases , ratio error_____(Increases/Decreases).
14) In a breaker back up protection, different breakers are provided for main and back up protection. Determine whether the given statement is TRUE or FALSE.

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	a)	Draw the basic connection of Trip circuit and explain how it works.	**07**
	b)	Draw the vector diagram of current transformer (CT). With the help of vector diagram explain what current ratio error is?	**07**
Q-3		**Attempt all questions**	**(14)**
	a)	Draw the construction of Balanced Beam Relay. Explain its operation and give the equation of torque.	**07**
	b)	Draw the construction of Directional Relay. Explain the principle of directional relay operation.	**07**
Q-4		**Attempt all questions**	**(14)**
	a)	Draw the magnetizing curve of current transformer (CT). Indicate various regions on the curve and explain each region.	**07**
	b)	Calculate the VA output required for a C.T. of 5 A rated secondary current when burden consists of relay requiring 10 VA at 5 A plus loop lead resistance of 0.2 Ω.	**07**
Q-5		**Attempt all questions**	**(14)**
	a)	Draw and explain the principle of circulating current Differential (MERZ-PRIZE) protection.	**07**
	b)	Give the types of test performed on relays. Explain primary and secondary current injection test.	**07**
Q-6		**Attempt all questions**	**(14)**
	a)	Draw the R-X diagram of plain impedance relay and explain its characterisitcs on R-X plane.	**07**
	b)	Explain how an induction motor is protected from single phasing.	**07**
Q-7		**Attempt all questions**	**(14)**
	a)	Draw the schematic diagram of carrier current protection and explain the function of each equipment.	**07**
	b)	Explain the theory of core balance current transformer for earth fault protection.	**07**

Q-8 **Attempt all questions** **(14)**

a) State the various functional circuits in a static relay with the help of block diagram. Explain the fuction of each block. **07**

b) Give any seven advantages of static relay over electromagnetic relays. **07**