Total No. of printed pages = 4

CAI-603/SS&P/6th Sem/2016/N

SUBSTATION, SWITCHGEAR AND PROTECTION

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer any *five* questions.

1. (a) "Buchholz relay provides protection against all kinds of incipient faults such as insulation failure of windings, core heating, fall of oil level due to leaky joints etc." With a neat diagarm, explain how a Buchholz relay protects a transformer. 11

   (b) What are the different types of faults that may occur in an alternator ? 3

[Turn over

2. (a) What do you mean by relay timing ? What are instantaneous and inverse time relay ? Also define, pick-up current and current setting. 1+5+2=8

(b) Write some advantages of SF_6 circuit breaker. 6

3. (a) Write about the following : 3×3=9

(i) equipment grounding

(ii) reactance grounding

(iii) neutral grounding.

(b) What is a fuse ? How it protects an electrical appliance from damage ? 1+2=3

(c) Write some advantages of neutral grounding. 2

4. (a) What are the fundamental requirements of protective relaying ? 6×½=3

(b) On which principle most of the power system relays work ? 2

(c) What are electromagnetic induction relays ? Derive an expression for torque of an induction relay. 9

5. (a) Discuss with neat diagram, different types of bus-bar arrangements in a sub-station. 10

(b) Write some advantages of vacuum circuit breaker. 4

6. (a) Draw the symbols of the following equipments used in the sub-station. $4 \times \frac{1}{2} = 2$

(i) Lightning arrester

(ii) Potential transformer

(iii) Current transformer

(iv) Oil circuit breaker.

(b) Write briefly about the classification of electrical sub-stations. 9

(c) What are the important equipments used in a transformer sub-station ? 3

7. (a) Draw a neat diagram of typical A.C power supply scheme and write about the following : 3+8=11

(i) Generating stations

(ii) Primary transmission

(iii) Secondary transmission

(iv) Primary distribution.

(b) What is an induction type directional power relay and how does it operate ? 3

8. Write short notes on any *two* : 7×2=14

(a) Faults in power system

(b) Underground sub-station

(c) Induction type over current relay

(d) Symmetrical component.