



SE-7405

B. E. - IV (Sem. VII) (Elect.) Examination

April / May - 2011

Electrical Power System - III

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशांशक निशानोंवाणी विगतो उत्तरवडी पर अवश्य कभवी. Fillup strictly the details of signs on your answer book.		Seat No. :	
Name of the Examination :		<input type="text"/>	
B. E. - 4 (Sem. 7)		<input type="text"/>	
Name of the Subject :		<input type="text"/>	
Electrical Power System - 3		<input type="text"/>	
Subject Code No. : 7 4 0 5		Section No. (1, 2,.....) : 1&2	
		Student's Signature	

- (2) Attempt all question.
- (3) Figures to the right indicate full marks.
- (4) Assume necessary data wherever required.
- (5) Scientific calculator up to Casio-100D, 100MS series is permitted.

SECTION-I

- 1 (a) (1) What is rupturing capacity of circuit breaker. 12
(2) Rated breaking capacity.
(3) RRRV.
(4) Transient recovery voltage.
(5) What is kelvins law of fuse ?
(6) Why DC arc is difficult to extinguish ?
(b) Define the term current chopping with diagram. 4
(c) Can we use a measuring CT (used for measurement purpose) for protection purpose, why ?. 4
- 2 (a) Classify circuit breakers on the basis of type and application (voltage, current levels). 8
(b) In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8Ω and $0.02\mu F$, respectively. A resistance of 600 ohms is connected across the contacts of the CB. Determine the following : 8

- (i) Natural frequency of oscillation.
- (ii) Damped frequency of oscillation.
- (iii) Critical value of resistance which will give no transient oscillation.

OR

- 2 (a) Write note on the tem resistance switching. Its adopted for which type circuit breakers and why ? 8
- (b) A 50 Hz, 3-phase alternator with grounded neutral has an inductance of 1.6 mH per phase and is connected to the busbar through a CB. The capacitance to earth of the circuit between the alternator and CB is $0.0032 \mu F$ per phase. Due to a short on the bus-bar the breaker opens when the rms value of the current is 8000A. Determine the following : 8
- (i) Frequency of oscillations.
 - (ii) Active recovery voltage.
 - (iii) Time of maximum RRRV.
 - (iv) Maximum RRRV.
- 3 Answer any two : 14
- (1) Enumerate the chief requirements of the contact material for vacuum circuit breaker.
 - (2) Giving layout of short-circuit testing plant, explain the function of each of its components. Also explain how testing is carried out in such a plant.
 - (3) What is an arc ? Discuss theories of arc extinction.
 - (4) Draw the single line diagram of 66/11 kV substation and also list the major equipment used.

SECTION : II

- 4 (a) (1) Explain in brief availability based tariff (ABT). 12
- (2) Explain the significance of load factor and diversity factor.
 - (3) What are the advantages of dynamic programming ?
 - (4) Draw the fine heat rate curve and incremental fuel cost curve with their units.
 - (5) What is penalty factor ?
 - (6) Explain the term spinning reserve ?

- (b) A residential consumer has following gazettes at his premises : 8 bulbs of 100 Watt, 4 fans for 60 Watt each and 2 tube lights of 50 Watt each, his use of electricity during a day is as under : 6
- | | |
|---------------------------|-----------------------|
| 12:00 midnight to 5.00 am | 1 - fan |
| 5.00m to 7.00 am | 3-fans + 1 tube light |
| 7.00 am to 9.00am | Nil |
| 9.00 am to 6.00 pm | 2 - fans |
| 6.00 pm to Midnight | 2 - fans + 4 bulbs |
- Find (1) Connected load (2) Maximum demand (3) Demand factor (4) Eneregy consumed during 24 hours (5) Energy consumed in 24 hours if all the devices are used for whole day (6) Plot the variation of load demand vs time of the day.

- 5 (a) Write a short note on economic load sharing between two generators in the same plant considering transmission line losses. 7
- (b) The fuel inputs per hour of plants 1 and 2 are given as under : $F_1 = 0.2P_1^2 + 40P_1 + 120$ Rs. per Hr. 9

$$F_2 = 0.25P_2^2 + 30P_2 + 150 \text{ Rs. per Hr.}$$

Determine the economic operating schedule and the corresponding cost of generation if the max and min loading on each unit is 100 MW and 25 MW, the demand is 180 MW, and transmission losses are neglected. If the load is equally shared by both the units, determine the saving obtained by loading the units as per equal incremental production cost.

OR

- 5 (a) Derive the generalized formula of B_{mm} loss coefficient and also discuss the term penalty factor. 8
- (b) A system consits of 2 plants conntected by a tie line and load located at plant 2. When 100 MW are transmitted from plant 1, a loss of 10 MW takes place on the tie-line. Determine the generation schedule at both the plants and the power received by the load when λ for the system is Rs. 25 per MWh and the incremental fuel cost given by equations :

$$\frac{dF_1}{dP_1} = 0.03P_1 + 17 \text{ Rs. per M Hr.}$$

$$\frac{dF_2}{dP_2} = 0.06P_2 + 19 \text{ Rs. per M Hr.}$$

- 6** Attempt any two : **16**
- (1) Explain heat rate curve, cost curve and incremental fuel cost curve in detail with their units.
 - (2) A 250 kVA distribution transformer costs Rs. 20,000 and has a salvage value of Rs. 1000 at the end of 20 years, determine the depreciated value of the plant at the end of 10 years by (1) Straight line method (2) Sinking fund method.
 - (3) Discuss the different methods of calculating depreciation charges of power plant.
 - (4) Write a short note on load forecasting.
-