D 42507 (Pages 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2007

EE 04 704—POWER SYSTEMS—III

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

I. (a) Write short note on insulation co-ordination.

(b) Define and explain the following terms :

(i) Recovery voltage.

(ii) Restriking voltage.

(c) Explain main and back-up protection in protective relaying.

(d) Describe how a delta-star transformer can be protected against overcurrent.

(e) Explain the concept of regenerative braking.

(f) Explain different methods to generate high frequency voltage.

(g) Explain the main features and functions of SCADA system control.

(h) Write short note on FACTS.

(8 × 5 = 40 marks)

Part B

II. (a) With a neat diagram, explain the principle of operation of an axial air blast circuit breaker. (9 marks)

(b) Discuss the considerations in the selection of a circuit breaker. (6 marks)

Or

(c) Show that a travelling wave moves with a velocity of light on the overhead line and its speed is proportional to $\frac{1}{\sqrt{\epsilon_r}}$ on a cable with dielectric material of permittivity ϵ_r.

(15 marks)

III. (a) With a neat sketch explain the Merz-Price protection scheme for power transformers. (9 marks)

(b) What are the problems that arise in differential protection applied to power transformers. (6 marks)

Or

Turn over

(c) Explain the principle of distance relays, stating clearly the differences on R-X diagram and show where each type is suitable.

(15 marks)

IV. (a) Draw and explain the speed-time curve of a mainline service train. (6 marks)

(b) Deduce an expression for maximum speed and specific energy output using simplified speed-time curve.

(9 marks)

Or

(c) Explain with reasons, the desirable properties of resistance heating element. (6 marks)

(d) Discuss the construction and operation of different types of core-type induction furnaces.

(9 marks)

V. (a) Explain various types of D.C. links. (9 marks)

(b) Write short note on terminal components of HVDC transmission. (6 marks)

Or

(c) Explain various FACTS controllers.

(15 marks)

[4 × 15 = 60 marks]