MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Maisammaguda, Dhulapally, (Post Via kompally), Secunderabad-500 100.

IV B.TECH I SEM SUPPLEMENTARY EXAMINATIONS, APRIL – 2017
SUBJECT: <u>HIGH VOLTAGE ENGINEERING</u>

(BRANCH: **EEE**)

Time: **3 Hours**   Max Marks:75

Answer any 5 questions   **5 x15M =75M**

1. Explain various theories that explain breakdown limitation of each theory **[15M]**
2. a) Explain the different types of breakdown occurs in vacuum **[7M]**
   b) In an experiment in a certain gas it was found that the steady state current is
   5.5×10^{-8} A at 8 KV at a distance of 0.4 cm between the plane electrode keeping the
   field constant and reducing the distance to 0.1 cm results in a current of 5.5×10^{-9} A.
   Calculate Townsend's primary ionization co-efficient, α? **[8M]**
3. Classify the various breakdown mechanisms occurring on solid dielectrics and explain them
   briefly **[15M]**
4. Derive the necessary equation for
   a) Ripple **[7M]**
   b) Voltage drop in a cascade voltage multiplier- Circuits **[8M]**

5. a) Explain the working and construction of electrostatic voltmeter **[8M]**
   b) Explain the voltage double circuit with neat sketches **[7M]**

6. a) Explain the two different theories of charge generation and separation in a thunder
   cloud **[10M]**
   b) Discuss how insulation coordination to protective devices used for the protection of
   equipment from over voltages **[5M]**
7. a) Explain a procedure to measure of resistivity of an insulation specimen. **[8M]**
   b) Draw a neat diagram of a high voltage Schering bridge and describe various features
   of the bridge **[7M]**

8. a) Explain the method of impulse testing of high voltage transformers, what is the
   procedure adopted for locating the failure **[8M]**
   b) What are the test conducted on isolators and circuit breaker? Explain in detail. **[7M]**

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IV B.TECH I SEM SUPPLEMENTARY EXAMINATIONS, APRIL – 2017

SUBJECT: Power System Operation And Control

(BRANCH: EEE)

Time: **3 Hours**   Max Marks:**75**

Answer any 5 questions   **5 x15=75M**

1.a) Explain the following terms with reference to thermal power plants.   [5M]
   i)   Heat rate curve   ii) Incremental production cost curve.
   b) Consider the following incremental cost curves in Rs/M Wh for a plant having 2
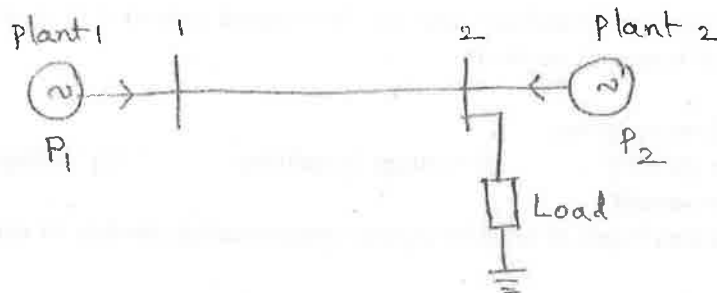   generators.
$$IC_1=0.20 \ P_1+40 \ Rs/MWhr$$
$$IC_2=0.25 \ P_2+30 \ Rs/MWhr$$
   Estimate the extra cost incurred in Rs/hr, if a load of 220 MW is scheduled as $P_1=P_2=110$
   MW   [10M]

2. a) What is penalty factor? Discuss its significance.   [5M]
   b) A two bus system is shown in fig. If 100 MW is transmitted from plant 1 to the load, a loss of 10
   MW is incurred.

   Determine the required generation for each plant and the power received by the load   when the
   System λ is Rs.25/MWhr.
$$\text{The IC's of the two plants are given below:}$$
$$IC_1 = 0.02P1 + 16 \ Rs/MWhr$$
$$IC_2 = 0.04P2 + 20 \ Rs/MWhr$$ [10M]

3. In a two plant operation system the hydro plant is operated for 8 hrs, during each day and
   the steam plant is operated over all the day. The characteristics of the steam and hydro
   plants are   [15M]
$$C_{th}=0.4P_{Th}^2+30 \ P_{Th} + 10 \ Rs/hr$$
$$W_h=0.12P_h^2+10 \ P_h \ m^3/sec$$
When both plants are running, the power flow from steam plant to load is 200 MW and the
total quanity of water used for the hydro plant operation during 8 hrs is 120 X $10^6 \ m^3$.
Determine the generation of hydro plant and cost of water used. Neglect the losses.

4. a) Explain in detail about different types of excitation systems. Also obtain the IEEE Type 1
   Model.
   b) Obtain the small signal Transfer function of speed governing system.   [9M +6M]

5. a) Discuss the necessity of keeping frequency as constant [5M]
   b) Discuss the steady state analysis of Load Frequency Control (LFC) of an isolated power system for free governing operation. [10M]

6.a) Two control areas have the following characterstics
   Area 1: R_1=0.011 p.u. D_1=0.85 p.u; MVA=1000
   Area 2: R_2=0.011 p.u. D_2=0.85 p.u; MVA=1200
   A load change of 200MW occurs in area 1
   Determine the new steady state frequency [7M]

   b) Two areas have the following specifications.
   Area 1: Rated capacity = 3000 MW
           Operating power = 2000 MW
           H = 5 Sec
           R = 3 Hz/Pu MW
   Area 2: Rated capacity = 9000 MW
           Operating power = 7500 MW
           H = 8 Sec
           R = 2.5 Hz/ Pu MW

   Assume 2% operating load increase of each area separately. Obtain the individual static frequency drop if the areas are not inter connected. [8M]

7. a) Discuss the importance of combined load frequency control and economic dispatch control. [8M]
   b) Show that steady state frequency error can be reduced to zero if PI controller is used in single area load frequency control. [7M]

8. a) Define the following terms [4M]
      i) Voltage stability   ii) Voltage instability   iii) Voltage collapse
      iv) Voltage security
   b) Discuss the various types of reactive power compensating devices to maintain the voltage stability. [11M]