Registration No:

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M.Tech.
P1IPBC04

1st Semester Regular/Back Examination 2017-18
ADVANCED POWER SYSTEMS
BRANCH: INDUS. POWER CONTROL AND DRIVES
Time: 3 Hours
Max Marks: 100
Q.CODE: B996
Answer Question No.1 is compulsory and any four from the rest.
The figures in the right hand margin indicate marks.

Q1   **Answer the following questions:** *multiple type or dash fill up type*   **(2 x 10)**
  a) The necessary condition for representing a transmission line with a voltage regulating transformer of off-nominal tap ratio 'a' using pi-model is ------------.
  b) The total number of load flow variables for an n-bus power system are,
     i)   N
     ii)   2n
     iii)   3n
     iv)   4n
  c) Which fault gives identical values for the +ve, -ve, and zero sequence currents?
     i)   L-G
     ii)   L-L-G
     iii)   L-L
     iv)   L-L-L
  d) If, penalty factor of a plant is '1', the incremental transmission loss may be,
     i)   1
     ii)   >1
     iii)   0
     iv)   <0
  e) In the optimal power flow problem, the vector of independent variables may include ----------- and -------------- variables.
  f) The failure rate is given by, $= K/_{nN}$, where 'K' represents ---------------.
  g) The major cause of voltage sag is -----------------------.
  h) Name a device that acts as a source of harmonic injection, ---------------------.
  i) The expression of load factor is ------------------.
  j) Any two factors affecting load forecasting are --------------- and ---------------.

Q2 **a)** Formulate the optimal hydro-thermal scheduling problem considering the inequality constraints of thermal generation and water availability using penalty functions as suitable.   **(10)**
  b) Explain rigid limit and soft limit as regards to selection of penalty function.   **(10)**

Q3 **a)** Describe the procedure for modelling of a transmission line with a voltage regulating transformer of off-nominal tap ratio 'a' using pi-model and indicate the equivalent circuit for the case.   **(10)**
  b) Compare the short transmission line model with that of the long transmission line model showing the application of each model.   **(10)**

Q4 **a)** Discuss the step wise procedure for implementation of Fast Decoupled Load Flow with a clear presentation of the algorithm/flow chart.   **(10)**
  b) Write the Jacobian Matrix for the Newton Raphson Load Flow and indicate the method of its formation.   **(10)**

Q5 **a)** Derive the equation for voltage sag in terms of fault level and impedances, separately.   **(10)**
  b) Plot the characteristics of voltage sag as a function of the length of fault point from the PCC.   **(10)**

Q6 **a)** Discuss clearly the mitigation methods used in practice for mitigation of voltage sag. **(10)**

b) Give a clear comparison between series voltage controller and a shunt voltage controller, in view of their application and performance. **(10)**

Q7 **a)** Give a detail explanation of multi-area power interchange mechanism used in deregulated power industry. How do market design and auction mechanism affect the power interchange schedule? Explain with example. **(10)**

b) Discuss the methods of small area load forecast and spatial load forecast. **(10)**