Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

P1EEBC04, P1IPBC04

1st Semester Regular Examination 2016-17
ADVANCE POWER SYSTEM
BRANCH: EE,EPS,ESE,PE,PED,PEED,PEPS,PEES,PSE,IPCD(PT)
Time: 3 Hours
Max Marks: 100
Q.CODE: Y861

Answer Question No.1 which is compulsory and any FOUR from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: ***Short answer type*** **(2 x 10)**

a) Why the Jacobian Matrix of a large power system is sparse? What are different methods to store a sparse matrix?

b) Explain Postage Stamp method.

c) State at least two reasons for increased power quality concern.

d) What are the sources of sags and interruption?

e) State the role of independent system operator (ISO) in open access and pool type power markets.

f) If penalty factor of a plant is unity, then what is it's Incremental Transmission loss?

g) Mention the harmonic sources from industrial loads.

h) What are the methods used for solving matrix equations consisting of sparse matrix?

i) Incremental fuel costs in Rs./MWh for a plant having two generators are $\frac{dc_1}{dp_{G1}} = 0.3P_{G1} + 30$ and $\frac{dc_2}{dp_{G2}} = 0.4P_{G2} + 24$. How they will share a load of 100 MW?

j) What is the difference between Economic load dispatch and optimal unit commitment?

Q2 **a)** The fuel inputs per hour of plants 1 and 2 are given as **(10)**

$$F_1 = 0.2P_1^2 + 40P_1 + 120\ Rs/hr$$
$$F_2 = 0.25P_2^2 + 30P_2 + 150\ Rs/hr$$

Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum of loading on each unit is 100 MW and 25 MW, the demand is 180 MW, and the 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.

b) Two 30 KVA, 11kV generators are operated parallel and having $Z_1=Z_2=j0.2$ p.u., $Z_0=j0.05$ p.u. A line to ground fault occurs on the generator terminals. Find the fault current and line to line voltages during fault conditions. Assume that the generator neutral is solidly **(10)**

grounded and the generator is operating at no load & at rated voltage at the occurrence of fault

Q3 **a)** Determine the co-efficient of transmission line loss. **(8)**

b) (i)What is Spatial load Forecasting? State its use and limitations. **(5+7)**
(ii)What is Deregulation and What are the steps towards Deregulation? Describe Pool model , pool and Bi-directional model

Q4 (i)What are the different voltage sag mitigation techniques? Explain in details. **(10+5+5)**
(ii) Write the various IEEE and IEC power quality standards.
(iii) Explain the sources of sags and the impacts of sags in appliances.

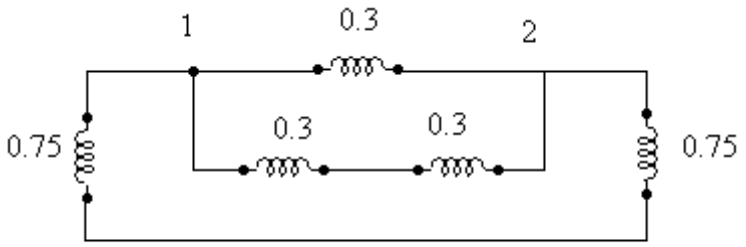
Q5 **a)** The statistical data provided by a distribution company indicates that there are 300 distribution transformers installed in the system. Over a period of 4 years, only 20 transformers show failure in operation and company replaced them all over a time of 200 hours .Calculate: (i) failure rate, (ii) expected time to failure, (iii) expected time to repair,(iv) repair rate ,(v) availability probability and (vi) unavailability probability. **(10)**

b) (i)What are the general causes of harmonics in power systems. **(5+5)**
(ii) Explain the sources of sags and the impacts of sags in appliances

Q6 **a)** (i)Derive the load flow equation of Gauss-Seidel method taking all buses as PQ bus as well as some buses are PV Buses. **(10+5)**
(ii) Compare G-S method and N-R methods of load flow solutions. How the convergence of N-R method is speeded up?

b) For a typical distributions system, the source impedance is 10 ohm & impedance of Feeder is 40 ohm on occurrence of fault. What is % of sag? **(5)**

Q7 **a)** (i)For the three bus network shown in Fig.1. Build Z_{BUS} by Z_{BUS} building algorithm. **(13+2)**



(ii)What is the transformation matrix for changing phase voltages to symmetrical components of voltages.

b) Write short notes on any one of the following: **(5)**
a. combined shunt and series controller.
b. Hydro thermal co-ordination.
c. Tap changing Transformer