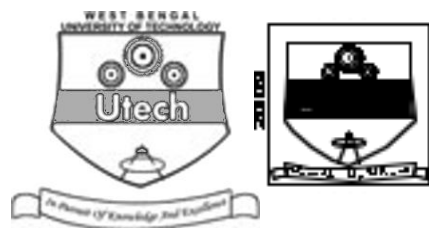


POWER SYSTEM - II (SEMESTER - 6)

CS/B.TECH(EE-N)/SEM-6/EE-602/09



1.
Signature of Invigilator

2.
Signature of the Officer-in-Charge

Reg. No.

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Roll No. of the
Candidate

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CS/B.TECH(EE-N)/SEM-6/EE-602/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

POWER SYSTEM - II (SEMESTER - 6)

Time : 3 Hours]

[Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
b) For **Groups – B & C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

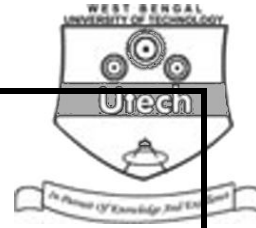
FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

	Group – A										Group – B					Group – C					Total Marks	Examiner's Signature
Question Number																						
Marks Obtained																						

.....
Head-Examiner/Co-Ordinator/Scrutineer

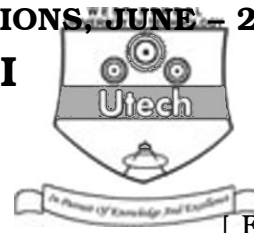
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ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
POWER SYSTEM - II
SEMESTER - 6




Time : 3 Hours]

[Full Marks : 70

GROUP – A**(Multiple Choice Type Questions)**

1. Choose the correct alternatives for any *ten* the following : 10 × 1 = 10
- i) Zero sequence fault current is absent when the fault is
- | | | |
|--------------------------------|-----------------------|---|
| a) single line to ground fault | b) line to line fault | |
| c) double line to ground fault | d) none of these. | <input style="width: 50px; height: 20px;" type="text"/> |
- ii) A Buchholz relay is actuated by
- | | | |
|------------|---------------------|---|
| a) oil | b) gas | |
| c) current | d) oil temperature. | <input style="width: 50px; height: 20px;" type="text"/> |
- iii) Surge impedance of transmission line is given by
- | | | |
|-----------------|--------------------------|---|
| a) $\sqrt{L/C}$ | b) $\sqrt{C/L}$ | |
| c) \sqrt{LC} | d) $\sqrt{\frac{1}{LC}}$ | <input style="width: 50px; height: 20px;" type="text"/> |
- iv) Current transformer saturation depends on
- | | | |
|-----------------------------|-----------------|---|
| a) fault current magnitude | b) burden | |
| c) fault occurrence instant | d) all of these | |
| e) none of these. | | <input style="width: 50px; height: 20px;" type="text"/> |
- v) A lightning arrester is basically
- | | | |
|--------------------|-------------------|---|
| a) surge absorber | b) surge diverter | |
| c) surge reflector | d) none of these. | <input style="width: 50px; height: 20px;" type="text"/> |
- vi) A 3-phase breaker is rated at 2000 MVA, 33 kV, its making current will be
- | | | |
|----------|----------|--|
| a) 35 kA | b) 49 kA | |
| c) 70 kA | d) 89 kA | |



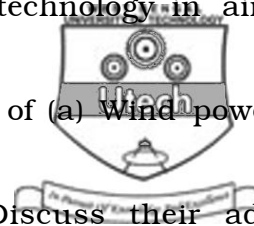
- e) none of these.
- vii) In a load flow study Z_{bus} matrix is a 
- a) null matrix b) sparse matrix
- c) full matrix d) unity matrix.
- viii) For the stable operation of interconnected system the passive element that can be used as interconnecting element is
- a) reactor b) resistor
- c) capacitor d) capacitor resistor.
- ix) The unit of inertia constant H is
- a) MJs/MVA b) MJ/MVA
- c) kV/MVA d) rad/MVA.
- x) Positive sequence components are present in
- a) L - L - G fault b) L - G fault
- c) 3-phase fault d) all types of fault.
- xi) Out of the following plant categories
- i) Nuclear
- ii) Run-off river
- iii) pumped storage
- iv) diesel plant,
- the base load plant are
- a) (i) and (ii) b) (ii) and (iii)
- c) (i), (ii) and (iv) d) (i), (iii) and (iv)
- e) (i) only.

GROUP – B**(Short Answer Type Questions)**Answer any *three* of the following. $3 \times 5 = 15$

2. Explain the function of a "Surge tank" in Hydro-electric power plant.
3. What is "accelerating factor" ? Why is it used in load flow studies ?



4. Differentiate between cross blast and axial blast technology in air blast circuit breakers.
5. What are the guiding factors in the selection of site of (a) Wind power station and (b) Thermal power station ?
6. Why do we use reactors in power system ? Discuss their advantages and disadvantages.



GROUP – C

(Long Answer Type Questions)

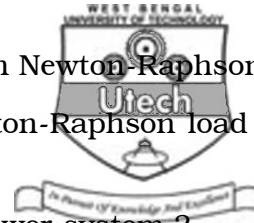
Answer any *three* questions.

3 × 15 = 45

7. a) Explain with sketch the construction, use and advantages and disadvantages of SF₆ circuit breaker.
- b) A 50 Hz, 11 kV, 3-phase, neutral earthed alternator is connected to the bus bar through a circuit breaker. The system has inductive reactance of 50 ohm/phase and capacitance of 0.02 μF/phase. A fault occurs just beyond the circuit breaker, which opens when the symmetrical SC current is 7500 A. Assuming the resistance of the generator to be negligible, calculate :
 - i) maximum voltage across the contacts of breaker.
 - ii) frequency of oscillations
 - iii) maximum value of RRRV
- c) Show by sketch, the arc voltage, the recovery voltage during arc extinction.
8. a) What do you mean by critical clearing angle ? Obtain an expression for the critical clearing angle with the aid of equal area criterion.
- b) Find the critical clearing angle for the system shown in the figure for a three-phase fault at the point 'P'. The generator is delivering 1.0 P.U. power under prefault conditions.

Dia.

6 + 9



9. a) Develop a suitable algorithm for load flow solution Newton-Raphson method.
- b) Obtain de-coupled load flow equations from Newton-Raphson load flow equations indicating all the assumptions.
- c) What is the necessity of having slack bus in a power system ?
- d) One line diagram of a single 4-bus system is given in fig. below. The relevant per unit line impedances are indicated on the diagram. The shunt admittances at the buses may be neglected.
- Determine Y_{BUS} if buses 1 & 2 are not connected, as indicated by the dotted line in fig.
 - What modifications have to be carried out in Y_{BUS} if the buses 1 & 2 are connected as indicated by the dotted line in the fig.

Fig.

4 + 3 + 2 + 6

10. a) Explain clearly the basic principle of operation of a differential relay. What is meant by per cent bias ? How is this achieved in practice in differential relay ? Under what circumstances is a percentage differential relay preferred over differential relay ?
- b) Describe different types of production of oil filled Y/ Δ transformer. 9 + 6
11. Write short notes on any *three* of the following : 3 × 5
- Earth fault protection for alternator.
 - Air break circuit breaker.
 - Comparism of different methods of power generation.
 - Current chopping.
 - Advantages of symmetrical component method of analysis of asymmetrical faults.



END

