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

1. .....
*Signature of Invigilator*

2. .....
*Signature of the Officer-in-Charge*

***Reg. No.*** | | | | | | | | | | | | | | |

***Roll No. of the Candidate*** | | | | | | | | | | | | | | |

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

**ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009**

**POWER SYSTEM ( 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**

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Marks Obtained

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

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**Head-Examiner/Co-Ordinator/Scrutineer**

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**ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009**

# POWER SYSTEM

**SEMESTER – 6**

Time : 3 Hours ] [ Full Marks : 70

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## GROUP – A

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Which of the following is the protective device against lightning over voltage ?

a) Rod gap b) Surge absorbers

c) Horn gap d) All of these.

ii) $SF_6$ is a

a) natural gas b) electro-negative gas

c) neutral gas d) electro-positive gas.

iii) Oil in Bulk oil circuit breaker is used for

a) cooling b) insulation

c) arc quenching d) none of these.

iv) The minimum oil circuit breaker has less volume oil because

a) there is insulation between contacts

b) oil between the breaker contacts has greater strength

c) solid insulation is provided for insulating a contacts from earth

d) none of these.

v) The reflection co-efficient of a short circuited line for voltage is

a) – 1 b) + 1

c) 0·5 d) zero.

vi) The rotation of disc of an induction disc relay under the poles is

a) from unshaded pole to shaded pole

b) from shaded pole to unshaded pole

c) it depends upon the magnitude of current

d) it depends upon the C.T. secondary connection. ☐

vii) The normal practice to specify the making current of a circuit breaker is in terms of

a) r.m.s value b) peak value

c) average value d) both r.m.s. and peak values. ☐

viii) Load flow study is carried out for

a) fault calculation b) stability study

c) system planning d) load frequency control. ☐

ix) The operator '*a*' rotates the phasor in the anticlockwise direction through an angle of

a) 90° b) 120°

c) 180° d) 360°. ☐

x) When a line to ground fault occurs, the current in a faulted phase is 100 A. The zero sequence current in this case will be

a) zero b) 3·3 A

c) 66·6 A d) 100 A. ☐

xi) The rate of rise of restricting voltage depends upon

a) type of circuit breaker

b) inductance of the system only

c) capacitance of the system only

d) both inductance and capacitance of the system

e) none of these. ☐



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## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following questions. 3 × 5 = 15

2. What are surge absorbers and how do they differ from surge diverters ?

3. Explain percentage reactance and short circuit kVA.

4. Explain the high resistance method of arc extinction in a circuit breaker.

5. Classify the different types of relays on the basis of their operation and application.

6. Explain the mechanism of voltage rise in a transmission line due to arcing ground.

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following questions. 3 × 15 = 45

7. a) Develop load flow equations suitable for solution by

   i) Gauss-Scidet method

   ii) Newton-Raphson method.

   b) A synchronous generator is operating at an infinite bus and supplying 0·45 P.U of its maximum power capacity. A fault occurs and the reactance between the generator and the line becomes four times its value before the fault. The maximum power that can be delivered after the fault is cleared is 70% of the original maximum value. Determine the critical clearing angle.

8. a) What is understood by unsymmetrical fault ?

   b) In a 3-phase 4-wire system, the current in *R*, *Y* and *B* lines under abnormal conditions of loading are $I_R = 200\angle 30^\circ$ A, $I_Y = 100\angle 300^\circ$ A and $I_B = 60\angle 180^\circ$ A.

   Calculate the zero, positive and negative sequence currents in the '*R*' line and the return current in the neutral wire.



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9. What is an impedance relay ? Explain its principle of operation. Show its characteristics on *R-X* diagram. What is the advantage of this relay for transmission line protection ?

10. Describe the construction, principle of operation and application of $SF_6$ circuit breakers. Explain the current chopping process in $SF_6$ circuit breakers.

11. Write short notes on any *three* of the following :

    a) Valve type lightning arrester

    b) Ferranti effect

    c) Vacuum circuit breaker

    d) Induction type directional overcurrent relay

    e) Surge impedance and its effect on reflection co-efficient.

END

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