	Utech
Name:	
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Invigilator's Signature :	

CS/M.Tech(EE)/SEM-2/PSM-204(a)/2012 2012

HIGH VOLTAGE DC TRANSMISSION

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

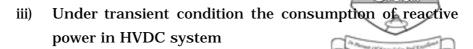
GROUP - A (Multiple Choice Type Questions)

- 1. Choose the correct alternatives for the following : $10 \times 1 = 10$
 - i) Harmonic filters are used in HVDC system, on
 - a) AC side
- b) DC side
- c) both (a) and (b)
- d) all of these.
- ii) Graetz bridge in DVDC is a
 - a) basic model on an HVDC converter in the 1- ϕ fullwave bridge circuit
 - b) basic model on an HVDC converter in the 3- ϕ fullwave bridge circuit
 - c) basic model on an HVDC converter in the 3- ϕ halfwave bridge circuit
 - d) none of these.

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- a) is much lesser
- b) is much higher
- c) remains constant
- d) none of these.
- iv) Vector power factor in HVDC system is a
 - a) measurement factor
- b) displacement factor
- c) velocity factor
- d) none of these.
- v) Excitation advance angle operators in
 - a) reactive mode
- b) inverter mode
- c) both (a) and (b)
- d) none of these.
- vi) In HVDC system commutation time is the
 - a) transfer of voltage from one phase to another phase requirer a finite time
 - b) transfer of current from one phase to another phase requirer a finite time
 - c) transfer of current from one phase to another phase requirer a infinite time
 - d) transfer of voltage from one phase to another phase requirer a infinite time.
- vii) In inverter mode of operation at commutation
 - a) $\alpha > 240^{\circ}$
- b) $\alpha > 120^{\circ}$
- c) $\alpha < 120^{\circ}$
- d) $\alpha > 60^{\circ}$.

- viii) In terms of RMS line-to-neutral voltage, the no-load $V_{do} = 2.24 E_{LN}$ b) $V_{do} = 2.34 E_{LN}$ direct voltage
- c)
- $V_{do} = 2.24 E_{IL}$ d) $V_{do} = 2.34 E_{IL}$
- Use of smoothing reactors in HVDC system is to ix)
 - decrease harmonic voltage and current a)
 - increase harmonic voltage and current b)
 - c) decrease harmonic current only
 - decrease harmonic voltage only. d)
- 'Back to Back' HVDC system is used for x)
 - asynchronous ties a)
- b) synchronous ties
- c) both (a) and (b)
- d) none of these.

GROUP - B

Answer the following questions.

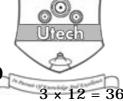
 $3 \times 8 = 24$

- 2. What is 'MTDC' system? Write its applications. Discuss in brief with diagram, the types of MTDC system. Compare series and parallel MTDC systems.
- How many types of 'HVDC links' are there? Discuss with 3. necessary diagram. What are the functions of smoothing What are the different applications of DC transmission system?
- What is commutation? What do you mean by single 4. commutation and double commutation failure? Discuss about 'Back fire' with necessary diagram.

GROUP - C

(Long Answer Type Questions)

Answer the following questions.



- 5. In a 6-pulse full-wave bridge circuit with ignition angle α and commutation angle μ , find the voltage drop due to overlap and hence derive the expression of equivalent commutating resistance.
- 6. A 3- ϕ , 12-pulse rectifier is fed from a transformer with nominal voltage rating of 220 kV / 110 kV.
 - a) If the primary voltage is 230 kV and the effective turns ratio T is 0.42, determine the dc output voltage when the ignition delay angle α is 28° and the commutation angle μ is 16°.
 - b) If the direct current delivered by the rectifier is 2000 A, calculate the effective commutating reactance X_c , RMS fundamental component of alternating current, power factor, $\cos \phi$ and reactive power at the primary side of the transformer.
- 7. Find the average direct voltage for a 6-pulse full wave bridge circuit with no ignition delay angle. Draw necessary diagram. Also show the direct current I_d for any two (one from upper row and another from lower row) thyristor.
