CS/B.Tech(ICE & EIE (OLD))/SEM-8/EE-802g/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(ICE & EIE (OLD))/SEM-8/EE-802g/09

ENGINEERING & MANAGEMENT EXAMINATIONS, APRIL – 2009

NON-CONVENTIONAL ENERGY SOURCES (SEMESTER - 8)

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**

Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

....

Head-Examiner/Co-Ordinator/Scrutineer

88811(O)/EE-802(G) (27/04)

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ENGINEERING & MANAGEMENT EXAMINATIONS, APRIL – 2009

NON-CONVENTIONAL ENERGY SOURCES

SEMESTER - 8

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) MNES (Ministry of Non-conventional Energy Sources) was established in

a) 1981 b) 1982

c) 1987 d) 1992. ☐

ii) The production of biogas through anaerobic digestion depends on slurry

a) temperature b) both temperature and pH value

c) pH value d) pressure. ☐

iii) Electrical machines used in fan wind turbine power generation are

a) synchronous machines only b) induction generators only

c) DC generators only d) any of these. ☐

iv) Peak power rating of a typical solar cell of 10 cm diameter is

a) 1 watt b) 5 watt

c) 10 watt d) 100 watt. ☐

v) A full tidal cycle is of the duration of

a) 6 hrs b) 12 hrs

c) 12 hrs 25·2 minutes d) 24 hrs. ☐

vi) Which one is correct with conventional sysmbols ?

a) $P = \frac{1}{2} \rho A^2 V^3$ b) $P = \frac{1}{2} \rho A V^2$

c) $P = \frac{1}{2} \rho A V^3$ d) $P = \frac{1}{2} \rho A^2 V^2$. ☐

vii) For a horizontal axis windmill the tip speed ratio is

a) a cubic function of number of blades

b) proportional to the number of blades

c) inversely proportional to the number of blades

d) a square function of number of blades. ☐

viii) The solar insolation on a clear day on the equator at mean sea level is

a) 1 mW/m^2 b) 1 W/m^2

c) 1 kW/m^2 d) 1 MW/m^2. ☐

ix) The number of blades of multi-blade wind turbine usually ranges from

a) 13 to 30 b) 12 to 20

c) 14 to 28 d) 16 to 32. ☐

x) The main component of biogas is

a) Methane gas b) Nirogen gas

c) Carbon dioxide gas d) Oxygen gas. ☐

GROUP – B

(Short Answer Type Questions)

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

2. a) What is the source of tidal energy ?

   b) Draw a schematic layout of linked basin tidal plant & explain its operation. 2 + 3

3. a) What is the origin of biomass energy ? What is its global potential ?

   b) What is understood by energy farming ? 3 + 2

4. Which type of non-conventional energy source is the best suitable for rural India ? Explain. 5

5. Discuss environmental effect of NCES. 5

6. Find the open circuit voltage of the single crystal silicon solar cell having the short circuit current rating of I_S = 3 amps & dark current (I_0) = $5*10^{-9}$ amps at 28°C. Find the peak power with a fill factor of 0·8. 5

GROUP – C

(Long Answer Type Questions)

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

7. a) Describe the fabrication process of silicon single crystal solar cell starting from SiO_2 .

   b) Draw a sketch & lebel the following parts – encapsulation, anti-reflecting coating, current collecting fingures, *p-n* junction with depletion layer & the bottom electrode.

   c) Explain why series-parallel connection of solar cells are made. Why are diodes put in the series link in a given direction ? 5 + 5 + 5

8. a) Explain the principle of operation of Horizontal Axis Wind Turbine (HAWT) with the help of a diagram.

b) Derive the relation between extracted wind power and unperturbed wind speed by Betz Model.

c) What is understood by pitch angle ? 7 + 7 + 1

9. a) How is geothermal energy generated inside the earth crust ?

b) Critically assess the potential of geothermal energy as an alternative source of energy.

c) Discuss on the prospects of geothermal energy in India. 3 + 6 + 6

10. a) What is bio-mass ? How is it useful ?

b) Discuss briefly a type of Biogas gasifier.

c) How bio-energy may be useful for rural application ? 5 + 5 + 5

11. Write short notes on any *two* of the following : $2 \times 7\frac{1}{2}$

a) Ocean thermal energy conversion

b) Single basin tidal system

c) Vertical axis wind turbine.

END