(viii) Benefits derived from an ERTM solution means
(a) real time visibility (b) fewer missed deals
(c) centralized control (d) all of these.

(ix) Main considerations needed for economic development of a country depend on the long-term availability of energy from sources that is / are
(a) accessible (b) affordable
(c) adoptable (d) all of these.

(x) To use nuclear energy in India, which one of the following is most appropriate
(a) environmentally-clean technologies
(b) foreign collaboration
(c) huge investment in the energy sectors
(d) waste and risk management.

Group - B

2. (a) Mention the objectives (at least five) needed for fixing energy pricing in a most holistic manner for a society by the energy generating organizations keeping in view all the major stake-holders intact.

(b) With the help of following fig.1,

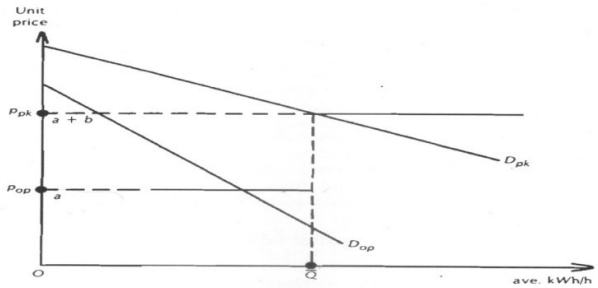

fig. 1

Prove the relationship, $\frac{\delta(SC)}{\delta R} = -\frac{\delta(OC)}{\delta R}$ with inherent conditions.

5 + 7 = 12

3. (a) What are the key influences on Energy Demand in future days (up to the year 2050) especially in the context of electricity consumption. To meet future energy demand what are the major areas to be stressed upon besides the conventional energy routes of energy generation.

(b) Define Energy Intensity and Energy Elaslicity and also their difference while understanding those in real perspective.

(c) Mentioning the Energy Sector and Rest of the Economy, draw the I Equilibrium Framework for energy pricing in a short period of time

4 + 4 + 4

Group - C

4. (a) Considering the exponential growth of the World's population ar per capita energy consumption rate (which also follows the expon growth pattern), prove the following equation as given below :

$$\mathbf{E = PE_{PO}}$$

(b) Mention the areas of Renewable energy sources which have potentials for the future energy need of India and justify your ideas

(c) With a neat diagram show the various zones of a Biomass Gasifi System and mention the temperature range in each of the zone with following items :
(i) chemical reactions involved in the system
(ii) volumetric composition of biomass-based producer gas, and
(iii) the heating value of the above-mentioned gas.

4 + 4 + 4

5. (a) To derive an optimal benefit from a next generation Energy Tradir Risk Management System (ETRM), mention the areas which are nurtured scientifically, keeping in view the overall growth of e generation and its trading.

(b) Discuss in details the Business and Architectural Expectations fr Energy Trading and Risk Management System.

6 + 6

Group - D

6. (a) What is the Levelized Cost of Electricity ? What is its scope ? Me and discuss the input variables which could play an important role fixing the cost of energy.

(b) Prove the following equations given below (assuming the equ LCOE=w + f + c.Δ) :

$$c = \frac{SP}{m \cdot CF \cdot \sum_{i=1}^{T} x^{i-1} \cdot \gamma^{i}}$$

$$f = \frac{\sum_{i=1}^{T} F_i \cdot \gamma^i}{m \cdot CF \cdot \sum_{i=1}^{T} x^{i-1} \cdot \gamma^i}$$

$$w = \frac{\sum_{i=1}^{T} W_i \cdot x^{i-1} \cdot \gamma^i \cdot m \cdot CF}{m \cdot CF \cdot \sum_{i=1}^{T} x^{i-1} \cdot \gamma^i} = \frac{\sum_{i=1}^{T} W_i \cdot x^{i-1} \cdot \gamma^i}{\sum_{i=1}^{T} x^{i-1} \cdot \gamma^i}$$

6 + 6 = 12

7.(a) Define Risk and Return with emphasis on its individual elements and measurements for each of the item for energy production.

(b) What is Building Energy Modelling ? Mention the Energy-Efficiency Considerations related to Project Costs, Benefits and Risks.

6 + 6 = 12

Group - E

8. (a) "Considering the huge population of our country and lack of proper utilization of non-fossil fuel reserves and keeping in view the climate change of the World, India could tap its vast resources of renewable sources of energy through energy-efficient production routes". Mention your views on the following topics (any two) :

(i) Overview of low-impact renewable energy technologies,

(ii) Energy planning tools, and

(iii) Policy framework for promotion of renewable energy.

(b) Mention the scopes of following to develop Renewable Energy Based Power Generation Projects in India (any two) :

(i) Foreign Investment Policy

(ii) Energy Security Policy

(iii) Industrial Policy

(iv) Policies for Small-scale Industries

8 + 4 = 12

9. Keeping in mind the prevailing Environmental concerns and Regulations, discuss the following in order to mitigate the threats being posed to humanity (any three) :

(i) Carbon Emission and Global Warming

(ii) Depletion of Ozone

(iii) Fossil Fuel Related Pollutants in the Environment

(iv) Emission from Nuclear waste.

(4 × 3) = 12

ENERGY TRADING AND PRICING

(REEN 6142)

Time Allotted : 3 hrs **Full Marks :**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group

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

Group – A

(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1**

(i) Partial equilibrium framework for energy pricing require/s
(a) electricity sub-sector
(b) oil sub-sector
(c) outputs and inputs (shadow priced)
(d) all the conditions.

(ii) To find peak load pricing model, following inputs are needed
(a) peak demand (b) optimum demand
(c) Price (optimum & peak) (d) all the conditions.

(iii) Which of the following resources has highest energy density?
(a) Solid fossil fuel (b) Liquid fossil fuel
(c) Gaseous fossil fuel (d) Nuclear fuel.

(iv) Which of the following tool runs on a linear programming model?
(a) ENPEP (b) MARKAL (c) LEAP (d) MAEL

(v) At a fundamental level, which one of the following improvemen the key influence on energy demand?
(a) Population (b) Economic growth
(c) Energy efficiency (d) All of these.

(vi) Among the largest energy consumers of the World, India's rank is
(a) third (b) sixth (c) fifth (d) eighth.

(vii) Isentropic process means
(a) dQ= 0 (b) dV = 0 (c) dT = 0 (d) dS = 0