

8E4049

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8E4049

**B. Tech. VIII Semester (Main/Back) Examination-2014****Mechanical Engineering****8ME1 Renewable Energy Technology****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

*Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

**Unit - I**

1. a) Discuss different renewable sources of energy with special reference to Indian context. (8)
- b) Describe the principle of solar photovoltaic energy conversion and also give their advantages and disadvantages. (8)

**OR**

1. a) Write short notes on
  - i) materials for Flat plate collector
  - ii) Solar distributed collector power plant
  - iii) Solar chimney power plant.
  - iv) Solar thermal storage. (4×2=8)
- b) Write short notes on followings
  - i) MPPT
  - ii) Limitations of SPV system
  - iii) V-I and P-V characteristics of SPV system
  - iv) Building integrated photo voltaics (BiPV) (4×2=8)

**Unit - II**

2. a) Explain the working of horizontal axis two blade windmill with suitable diagram. (8)
- b) What methods are used to overcome the fluctuating power generation of a wind mill? Discuss their merits and demerits (8)

**OR**

2. a) Explain the momentum theory in wind power generation. Give the classification of rotor used for wind power generation. (8)

- b) What do you know about Indian wind power programme? Discuss the site selection for wind power generation. (8)

### Unit - III

3. a) Explain the working principle of open cycle OTEC system with suitable diagrams and also state their limitations. (8)
- b) Determine the overall efficiency of an OTEC plant if surface warm water temperature is  $27^{\circ}\text{C}$  and deep cool water temperature is  $4.5^{\circ}\text{C}$ . It can be assumed that the relative efficiency factor of power plant is 55%. (8)

### OR

3. a) Explain the various methods of tidal power generation. What are the limitations of each method? (8)
- b) Describe the followings
- Tidal wave energy.
  - Progressive wave energy. (4×2=8)

### Unit - IV

4. a) Discuss different systems used for generating power using geothermal energy. (8)
- b) Explain the difference between a Geothermal power plant and thermal power plant. What are the different sources of geothermal of energy. (8)

### OR

4. a) Draw schematic diagram of an MHD power generating system having heat recovery steam generator. Explain the functioning of the system. (8)
- b) Derive the equation for voltage and power output of MHD generator and also give the maximum power output. (8)

### Unit - V

5. a) What is fuel cell? Describe the principle of working of  $\text{H}_2\text{-O}_2$  cell also give their limitations. (8)
- b) Write short notes on followings.
- Molten Carbonate Fuel Cells (MCFC)
  - Solid Oxides Fuel Cells (SOFC)
  - Methanol fuel cells.
  - Phosphoric acid fuel cells. (4×2=8)

### OR

5. a) Discuss the various methods of hydrogen production with neat sketches. (8)
- b) Write short notes on followings.
- Economics of Hydrogen fuel.
  - merits and demerits of Hydrogen
  - Zinc air fuel cells (ZAFC)
  - Polymer exchange membrane fuel cells. (PEMFC) (4×2=8)

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**B. Tech. VIII Semester (Main/Back) Examination-2014****Mechanical Engineering.****8ME2 Operations Management****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

*Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

**Unit - I**

1. What is the importance of production function. Distinguish production management and operations management. (16)

**OR**

1. a) How is operations strategy related to business strategy? How does operations strategy impact business strategy? (8)  
 b) Explain the concept of productivity. What are the factor affecting the productivity? (8)

**Unit - II**

2. a) What is continuous and batch production? What are its characteristics, advantages and limitations? (8)  
 b) Explain the factors affecting process planning. (8)

**OR**

2. a) Define the term process planning. (4)  
 b) Explain the various steps involved in process planning. (12)

**Unit - III**

3. a) What is MRP II? How does it differ from MRP? Explain. (8)  
 b) What is master production? Explain the functions of master production schedule. (8)

**OR**

3. Describe the various steps involved to MRP system. State the benefits and limitations of MRP. (16)

**Unit - IV**

4. Explain following (16)
- a) Routing
  - b) Scheduling.

**OR**

4. a) What do you understand by planning and control? Give its objectives. (8)
- b) Explain the follow up of PPC. (8)

**Unit - V**

5. a) Explain what do you mean by a material with independent demand. Give an example and explain why its demand is independent? (8)
- b) A firm uses every year 16000 units of a raw material costing Rs. 1.5 per unit. Ordering cost is Rs. 12 per order and holding cost is 5% per year of average inventory.
- i) Find EOQ
  - ii) The firm follows EOQ purchasing policy. It operates for 300 days per year. Procurement time is 14 days and safety stock is 400 units. Find the reorder point, the maximum inventory and average inventory. (8)

**OR**

5. What are objectives and functions of material management? Derive EOQ. (16)
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**B. Tech. VIII Semester (Main/Back) Examination-2014****Mechanical Engineering.****8ME3 Gas Turbine & Gas power Plant****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

**Unit - I**

1. a) Compare reciprocating engines and gas turbine engines and explain why gas turbine engines are more suitable for aviation applications. **(6+2)**
- b) Draw a neat schematic diagram and T-s diagram of reheat cycle, having two turbines operating at optimum pressure ratios and prove the following relation for maximum specific work output of the cycle,  $r^{(\gamma-1)/\gamma} = (T_3/T_1)^{2/3}$ . **(2+6)**

**OR**

1. a) Draw schematic diagram and T-S diagram of a Heat Exchanger Cycle and derive an expression for its thermal efficiency. Discuss the effect of cycle pressure ratio and maximum and minimum temperature ratio on the cycle efficiency with the help of suitable diagram. **(2+4+2)**
- b) Why open cycle gas turbines are more in use than closed cycle gas turbines, explain? **(4)**
- c) Compare Reheat cycle with intercooler and Reheat cycle with intercooler and heat exchanger. **(4)**

**Unit - II**

2. Air at 15°C enters a gas turbine plant working at a pressure ratio of 15 with 1250°C turbine inlet temperature. Assume polytropic efficiency of compressor and turbine as 0.91, Cp for air and gases as 1.005 and 1.128 respectively,  $\gamma=1.4$  for both air and gases. Calorific value of fuel = 42000 kJ/kg, calculate, overall efficiency, specific work output, fuel air ratio and specific fuel consumption. **(4x4)**

## OR

2. A peak load generator is to be powered by a simple gas turbine with free power turbine delivering 20MW of shaft power. The following data are applicable:

Compressor pressure ration	11
Compressor isentropic efficiency	0.82
Combustion pressure loss	0.4bar
Combustion efficiency	0.99
Turbine inlet temperature	1150K
Gas generator turbine isentropic efficiency	0.87
Power turbine isentropic efficiency	0.89
Mechanical efficiency(each shaft)	0.98
Ambient condition	1bar, 288K
$C_p$ and $\gamma$ for air	1.005kJ/kgK and 1.4
$C_p$ and $\gamma$ for gases	1.148kJ/kgK and 1.33
Calorific Value of the fuel	43100kJ/kg
Calculate the air mass flow required and the SFC.	(16)

## Unit - III

3. a) Explain the working of Turbofan engine with the help of suitable diagram (8)  
 b) Derive the following relation for the intake of a turbojet engine:

$$P_0 / P_a = \left[ 1 + \left( \eta_c C_a^2 / 2 C_p T_a \right) \right]^{\gamma / (\gamma - 1)}, \text{ where } P_a, T_a \text{ are ambient pressure and temperature and } C_a \text{ is forward speed of aircraft.} \quad (8)$$

## OR

3. a) Explain the working of Ramjet engine with the help of suitable diagram. (7)  
 b) Write a note on following and explain their significance in aircraft propulsion:  
 i) Propulsion efficiency  
 ii) Efficiency of energy conversion  
 iii) Specific Thrust. (9)

## Unit - IV

4. a) Discuss the combustion process in combustion chamber of a gas turbine engine with the help of suitable diagram. (8)  
 b) Derive an expression for degree of reaction in axial flow gas turbines with the help of velocity triangles. (8)

## OR

4. a) Discuss the factors which affect combustion chamber performance. (8)  
 b) For an axial flow gas turbine, shaft work is 46.5kJ/kg, blade velocity is 183m/s, axial velocity of air is 91.5m/s, degree of reaction is 30%. Find inlet and outlet blade angles. (8)

## Unit - V

5. a) Describe the construction and working of free piston engine plant. (8)  
b) What are the advantages and disadvantages of gas turbine plant over steam power plant. (8)

OR

5. a) What are the advantages and disadvantages of gas turbine plant over gas power plant. (8)  
b) Write a note on uses of gas turbine materials. (8)

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**8E4052****8E4052****B.Tech. VIII Semester (Main/Back) Examination - 2014****Mechanical Engg.****8ME4.1 (Elective-II) Reliability and Maintenance Engg.****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.)

Use of following supporting material is permitted during examination.

1. Normal Distribution Table.

**Unit - I**

1. Write short notes on:

- a) Breakdown Maintenance v/s Time based Maintenance. (8)
- b) Preventive Maintenance v/s corrective maintenance. (8)

**OR**

1. Short notes on:

- a) Age Replacement v/s Periodic Replacement policy. (8)
- b) Cost of Maintenance v/s cost of Equipment. (8)

**Unit - II**

2. Compare various methods of Non-destructive testing and their applications with reference to their relative merits and demerits. (16)

**OR**

2. a) What is total productive maintenance? Explain pre-requisites for implementing TPM in any organisation. (8)



- b) What are the various parameter's required to be maintained in order to implement computerized maintenance system in an organisation? (8)

### Unit - III

3. Write short notes on following:

- Reliability function.
- Cumulative distribution function.
- Mean time to failure (MTTF)
- Hazard Rate function.

(4×4)

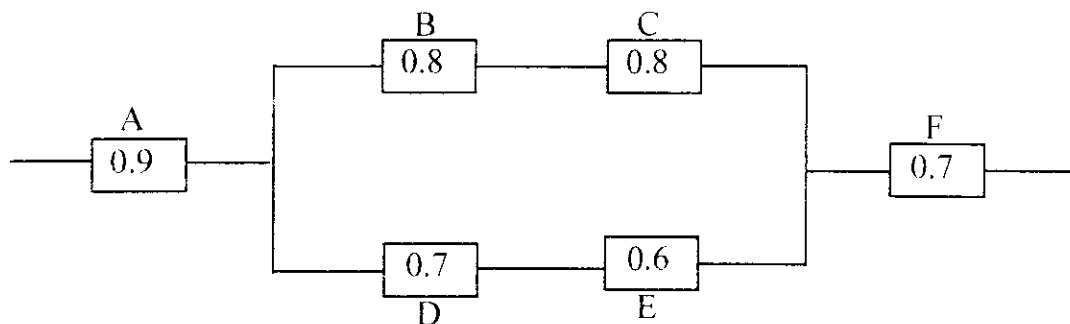
OR

3. For  $R(t) = e^{-t/10000}$ ;  $t \geq 0$

- Compute the reliability for a 50 hr mission.
- Given a 10 hr burn in period, compute the reliability for a 50 hr. mission.
- What is design life for a reliability of 0.95 give a 10 hr burn-in? (5,5,6)

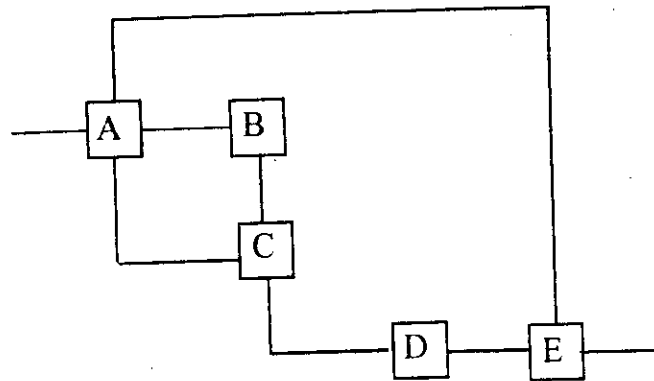
### Unit - IV

- Define Redundancy and classify various Redundancies. (8)
- Determine system Reliability for the following system. (8)



OR

- Explain the reliability design process and its effect on product life cycle. (8)
- Determine system reliability for the following system. (8)



A=0.9  
 B=0.8  
 C=0.7  
 D=0.6  
 E=0.75

### Unit - V

5. Write short notes on:

- ABC Analysis
- Selective control of spare's
- FSN Analysis
- VED Analysis.

(4×4)

OR

5. ABC Analysis

Stock Number	Annual \$ Volume	Percent of Annual \$ Volume
J24	12,500	46.2
R26	9,000	33.3
L02	3,200	11.8
M12	1,550	5.8
P33	620	2.3
T72	65	0.2
S67	53	0.2
Q47	32	0.1
V20	30	0.1

$$\Sigma = 100.0$$

What are the appropriate ABC groups of inventory items?

(16)