

Faculty of Engineering & Technology			
Ramaiah University of Applied Sciences			
Department	Mechanical & Manufacturing Engineering	Programme	B. Tech (CE, CSE, EEE)
Semester/Batch	02/2017		
Course Code	ESC101A	Course Title	Elements of Mechanical Engineering
Course Leader(s)	Dr. R. Suresh, Vijayakumar S., Pritam Bhat, Arun Karthik S., Sooraj Mohan, Bhargav, Manjunath U.		

Assignment -01			
Reg.No.		Name of Student	

Sections	Marking Scheme		Marks		
			Max Marks	First Examiner Marks	Moderator
Part A					
	A 1.1	Introduction to renewable and fossil fuel energy sources	3		
	A 1.2	Current and future energy utilization scenario	2		
	A 1.3	Challenges involved in replacing fossil fuels with renewable energy sources	3		
	A 1.4	Justification and Conclusion	2		
	Part-A Max Marks		10		
Part B.1					
	B 1.1	Estimation of the energy consumption	4		
	B 1.2	Surveying the commercially available panels	3		
	B 1.3	Justify the implementation of PV system	3		
	B.1 Max Marks		10		
Part B.2					
	B 2.1	Calculation of indicated power	3		
	B 2.2	Calculation of Mechanical Efficiency	2		
	B 2.3	Calculation of fuel cost for travel	2		
	B 2.4	Cost comparison with biodiesel	3		
	B.2 Max Marks		10		
Part B.3					
	B 3.1	Discussion on need for energy storage systems	2		
	B 3.2	Listing different energy storage systems	3		
	B 3.3	Discussion on form of energy stored in each system	2		
	B 3.4	Explanation of any one energy storage system	3		
	B.3 Max Marks		10		

Part B.4					
	B 4.1	Survey of types of boilers used in sugarcane industries	4		
	B 4.2	Explanation of the processes using steam in sugarcane industries	3		
	B 4.3	Construction and working of chosen boiler	3		
		B.4 Max Marks	10		
Total Assignment Marks			50		

Course Marks Tabulation				
Component-1 (B) Assignment	First Examiner	Remarks	Moderator	Remarks
A				
B.1				
B.2				
B.3				
B.4				
Marks (Max 50)				
Marks (out of 25)				
Signature of First Examiner		Signature of Moderator		

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – CET B: Assignment** table.
4. If the variation between the marks awarded by the first examiner and the second examiner lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks then both the examiners should resolve the issue in consultation with the Chairman BoE.

Assignment-01

Term - 1

Instructions to students:

1. The assignment consists of **5** questions: Part A – **1** Question, Part B- **4** Questions.
2. Maximum marks is **50**.
3. The assignment has to be neatly word processed as per the prescribed format.
4. The maximum number of pages should be restricted to **20**.
5. Restrict your report for Part-A to 3 pages only.
6. Restrict your report for Part-B to a maximum of 17 pages.
7. The printed assignment must be submitted to the course leader.
8. **Submission Date: 12-03-2018**
9. **Submission after the due date is not permitted.**
10. **IMPORTANT:** It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
11. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question

Preamble

This course is aimed at preparing the students to understand the concepts and underlying principles of mechanical engineering. The students are taught various types energy sources, power generation and energy conversion methods, types of power plants, working of IC engines, principles of refrigeration and air-conditioning and power transmission elements. Students are also taught the working principle and application of machine tools and related manufacturing processes.

Part -A**(10 Marks)**

In recent times, renewable energy sources like solar, wind are becoming more common for electric power generation due to its environment friendly operation. However challenges like intermittent energy availability and energy storage exists which needs to be addressed. On the other hand fossil fuels generate more energy per unit mass. In this context, debate on the following statement:

“Renewable energy sources can completely replace fossil fuel energy sources for electrical power generation by 2030”

Debate on the above statement considering the following points:

- A1.1.** Introduction to renewable and fossil fuel energy sources used for electric power generation
- A1.2.** Current and future energy utilization scenario of fossil fuels and renewable energy resources in India
- A1.3.** Challenges involved in replacing fossil fuels with renewable energy sources as prime electric power generation sources.
- A1.4.** Justification of the stance taken and conclusion

Part B**(40 Marks)****B .1****(10 Marks)**

Roof top solar photovoltaic (PV) systems are becoming common due to its cost savings and being ecofriendly. In this context do a survey to find the energy consumption for a large academic organization or large apartments and perform the feasibility study of implementing the PV system. From your study answer the following questions.

- B1.1** Detailed estimation of the energy consumption for your selection
- B1.2** Surveying the commercially available panels and find their specifications
- B1.3** Justify the implementation of PV system considering the present expenses on the electricity

Note: Consult the course leader for approval

B .2**(10 Marks)**

A car travels X km on a round trip from city A to city B at an average speed of Y km/hr. The 3 cylinder 1.2 L petrol engine of the car produces a brake power of 50 kW at a rated speed of 6200 rpm. The diameter of the cylinders is 0.073 m. The brake specific fuel consumption is P kg/kW-hr and indicated mean effective pressure is 1.1 MPa. Assume the fuel properties as necessary. Determine the following:

- B2.1.** Indicated power
- B2.2.** Mechanical efficiency
- B2.3.** Cost of fuel for travel between the cities
- B2.4.** Cost benefit, considering LPG as the alternative fuel having Z% higher efficiency compared to petrol

Note: Consult the course leader for the values of X, Y, P and Z

B .3**(10 Marks)**

Energy storage is a concept involving storage of surplus energy. The stored energy may be used suitably whenever the need arises. Electrochemical storage, Thermal Storage, Pumped hydro storage are few examples of energy storage systems. A Lithium ion battery is an example of electrochemical energy storage device, where the energy is stored in a battery in the form of electric charges. In this context,

- B3.1.** Discuss the need for energy storage systems.
- B3.2.** Survey and list the different energy storage systems.
- B3.3.** Discuss the form of energy stored in each system listed in B3.2.
- B3.4.** Explain any one energy storage system with a neat diagram.

B.4**(10 Marks)**

Industrial boilers are commonly used in sugar industries to provide steam requirements for different processes. For example, processes such as sugar cane juice concentration requires saturated and superheated steam. In this regard prepare a report addressing the following:

- B4.1** Survey of various boilers used in sugarcane industries
- B4.2** Explanation of the processes that uses steam in sugarcane industries
- B4.3** Construction and working of such boilers

Note:-Evidence for field study has to be enclosed