

Enrollment No.....



Faculty of Engineering  
End Sem (Odd) Examination Dec-2017  
FT3CO06 Fuel Technology

Programme: B.Tech.

Branch/Specialisation: FT

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. India is the ..... largest producer of coal in the world. **1**  
(a) First (b) Second (c) Fourth (d) Fifth
- ii. The Percentage of 'X' in coal determines the shape of fire-box and design of furnace. What is 'X' ? **1**  
(a) Hydrogen (b) Fixed carbon  
(c) Sulphur (d) Ash Content
- iii. Calorific value of Sulphur in Dulong's formula is: **1**  
(a) 34,500 Kcal/Kg (b) 8080 Kcal/Kg  
(c) 2240 Kcal/Kg (d) None of these
- iv. A fuel having high ignition temperature is: **1**  
(a) Petrol (b) Wood (c) Kerosene (d) LPG
- v. In Otto Hoffman's by product oven, H<sub>2</sub>S is recovered by using: **1**  
(a) Moist Fe<sub>2</sub>O<sub>3</sub> (b) Dry Fe<sub>3</sub>O<sub>4</sub>  
(c) Moist Fe<sub>3</sub>O<sub>4</sub> (d) Dry Fe<sub>2</sub>O<sub>3</sub>
- vi. Compression ratio is given by: **1**  
(a) Ratio of gaseous volume in the cylinder at the end of suction stroke to the volume at the end of compression stroke of the piston.  
(b) Ratio of gaseous volume in the cylinder at the end of compression stroke to the volume at the end of suction stroke of the piston.  
(c) None of these.  
(d) Other.

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[2]

- vii. In Liquid phase thermal cracking, which oils can be used? **1**  
(a) Heavy oils (b) Gas oils  
(c) Both (a) and (b) (d) Other
- viii. A fuel has 30% n-heptane and 70% iso-octane, its octane number should be: **1**  
(a) 130 (b) 100 (c) 70 (d) 40
- ix. Which of the following is a silent killer gas which combines with haemoglobin in the blood? **1**  
(a) CO<sub>2</sub> (b) CO (c) NO<sub>2</sub> (d) NO
- x. Which alcohol is prepared from water gas? **1**  
(a) C<sub>2</sub>H<sub>5</sub>OH (b) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH  
(c) CH<sub>3</sub>OH (d) C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>OH
- Q.2 i. Explain the process of washing of coal. **2**  
ii. How carbon and hydrogen are determine in the ultimate analysis of coal? **3**  
iii. Write a detail note on coal reserves in India. **5**
- OR iv. Give details of classification of coal. **5**
- Q.3 i. Differentiate between low temperature and high temperature carbonization. **3**  
ii. What is Otto Hoffman's process? Draw the labelled diagram and explain the recovery of by product. Also give the advantages and disadvantages of the process. **7**
- OR iii. A producer gas has following composition by volume: CH<sub>4</sub> = 4%, CO=26.0%, H<sub>2</sub>=10%, CO<sub>2</sub> = 10%, N<sub>2</sub>=50%. Calculate minimum quantity of air required for complete combustion of 1 m<sup>3</sup> of the fuel gas and percentage composition of dry products of combustion by volume when 20% excess air is used. **7**
- Q.4 i. Briefly explain crude oil classification. **2**  
ii. Explain the petroleum reserves in India. **3**  
iii. How the petroleum products are processed? Explain the refining process of crude oil products? **5**

[3]

- OR iv. What is cracking? How many types of cracking processes are there? Explain the fixed bed catalytic process in detail. **5**
- Q.5 Attempt any two: **5**  
i. Define octane number and cetane number. Which additives are used to boost the octane number and cetane number? **5**  
ii. What is flash and fire point? Which apparatus are used to determine the flash and fire point of fuel oil? Also explain their significance. **5**  
iii. What do you mean by viscosity? How many types of viscosity are there? Explain the viscosity Index. **5**
- Q.6 Write short note on any two: **5**  
i. Producer gas **5**  
ii. Hydrogen as fuel **5**  
iii. LPG **5**

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FT3CO06 Fuel Technology

Marking Scheme

Q.1	i.	India is the ..... largest producer of coal in the world. (c) Fourth	1	OR	iii.	Calculation of air – 2 marks Calculation of excess air – 1 mark Calculation of dry product – 4 marks	7
	ii.	The percentage of 'X' in coal determines the shape of the firebox and design of the furnace. What is 'X'? (b) Fixed carbon	1	Q.4	i.	Theory of formation of crude petroleum	2
	iii.	Calorific value of Sulphur in Dulong's formula is: (c) 2240 Kcal/Kg	1		ii.	Name of states and amount of petroleum available	3
	iv.	A fuel having high ignition temperature is: (b) Wood	1		iii.	Name of the processes and their description – 1 mark Refining process with diagram – 2 marks Different product at different temperature - 2 marks	5
	v.	In Otto Hoffman's by product oven, H <sub>2</sub> S is recovered by using: (a) Moist Fe <sub>2</sub> O <sub>3</sub>	1	OR	iv.	Cracking definition – 1 mark Types of cracking - 1 marks Fixed bed process with diagram – 3 marks	5
	vi.	Compression ratio is given by: (a) Ratio of gaseous volume in the cylinder at the end of suction stroke to the volume at the end of compression stroke of the piston.	1	Q.5	i.	Definition of octane and cetane number – 2 marks Structure of compound having octane and cetane number 0 and 100 – 1 mark Additives names for both – 2 marks	5
	vii.	In Liquid phase thermal cracking, which oils can be used? (b) Gas oils	1	OR	ii.	Definition of flash and fire point – 1.5 marks Description of apparatus used - 2 marks Significance of Apparatus – 1.5 marks	5
	viii.	A fuel has 30% n-heptane and 70% iso-octane, its octane number should be: (c) 70	1		iii.	Definition of viscosity – 1 mark Types of viscosity – 2 marks Viscosity Index – 2 marks	5
	ix.	Which of the following is a silent killer gas which combines with haemoglobin in the blood? (b) CO	1	Q.6		Write short note on	
	x.	Which alcohol is prepared from water gas? (c) CH <sub>3</sub> OH	1		i.	What is producer gas? Where it is available?- 2 marks How it is formed – 1 mark Reaction of formation – 1 mark Uses – 1 mark	5
Q.2	i.	Test for washing of coal	2		ii.	What is hydrogen fuel? Where it is available? – 2 marks How it is formed – 1 mark Reaction of formation – 1 mark Uses – 1 mark	5
	ii.	Determination of carbon with their significance – 1.5 marks Determination of Hydrogen with their significance – 1.5 marks	3	OR		What is LPG gas? Where it is available? – 2 marks How it is formed – 1 mark Reaction of formation – 1 mark Uses – 1 mark	5
	iii.	Types of coal - 1 mark Their amount and states where they are present – 4 marks	5				
OR	iv.	About Lignite – 1 mark Their amount and states where they are present – 4 marks	5				
Q.3	i.	Difference low temperature and high temperature carbonization Atleast three differences 1 mark each (1 mark * 3 = 3 marks)	3				
	ii.	Otto Hoffman's process – 1 mark Labeled Diagram – 2 marks Description of by product – 3 marks Advantages and disadvantages of process – 1 mark	7				

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