Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

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. Which of the following type of coal has maximum carbon and calorific value? **1**

(a) Anthracite (Hard coal) (b) Bituminous (soft coal)

(c) Lignite (Brown coal) (d) Wood coal

ii. India is the .....largest consumer of coal in the world. **1**

(a) Fifth (b) Third (c) Second (d) None of these

iii. Which gas has the least calorific value? **1**

(a) Coal gas (b) Water gas

(c) Producer gas (d) Natural gas

iv. An example of secondary fuel is: **1**

(a) Wood (b) Coal

(c) Natural gas (d) Gobar gas

v. Biomass energy can be obtained from: **1**

(a) Energy plantation

(b) Petro crops

(c) Agricultural and urban waste biomass

(d) All of these

vi. Latex containing plants rich in hydrocarbons: **1**

(a) Petro crops (b) Biomass crop

(c) Both (a) and (b) (d) None of these

vii. Gasohol is a mixture: **1**

(a) Ethanol and gasoline (b) CNG and natural gas

(c) Methanol and petrol (d) None of these

P.T.O.

viii. The temperature of diesel engine ranges: **1**
(a) 150-200^{0}C (b) 293-340^{0}C
(c) 150-250^{0}C (d) None of these

ix. Hydrogen fuel can be produced by .....process **1**
(a) Osmosis (b) Electrolysis
(c) Catalytic (d) None of these

x. .....is added to odourless LPG for instantaneous detection of any leakage. **1**
(a) Ethyl Mercaptan (b) Ethyl acetate
(c) Methyl Mercaptan (d) Ethyl Nitrate

Q.2 Attempt any two:

i. Write a detailed note on the reserves of coal in India and world? **5**

ii. How the coal is analysed? Explain the Ultimate analysis of coal with their significance. **5**

iii. What are fossil fuels? How many types of coal are there? How they are classified? Explain with their uses. **5**

Q.3 i. The ultimate analysis of coal gives C- 84%, S-1.5%, N-0.6%, H-5.5% O- 8.4%. Calculate the gross and net calorific value. **3**

ii. What is carbonization? How many types of carbonization process are there? Describe the Otto-Hoffmann method with diagram for manufacturing of metallurgical coke? **7**

OR iii. A producer gas following composition by volume: CH_4= 4% CO=26%, H_2 =10%, CO_2= 10% $N_{2=}$ 50%. Calculate minimum quantity of air required for complete combustion of 1m^3 of the fuel gas and percentage of dry product of combustion by volume when 20% excess air is used. Also calculate the volume of oxygen at 25^o C temperature and 750mm pressure. **7**

Q.4 i. Write the detailed note on reserves of hydrocarbon in India and World. **4**

ii. What do you mean by cracking? Explain the moving bed catalytic cracking with diagram. **6**

OR iii. Define fractional distillation process. Explain in detail the petroleum refining and processing. **6**

Q.5 i. Define Viscosity Index with formula. **2**

ii. Write any six difference between octane number and cetane number. **3**

iii. Write short note on: **5**
(a) AVL (Aviation liquid fuel)
(b) Kerosene

OR iv. Write short note on: **5**
(a) Flash and fire point (b) Furnace oil

Q.6 i. Why hydrogen cannot be used as fuel? **2**

ii. What is LPG? Write its uses? **3**

iii. Describe the synthesis gas under following heads: Manufacturing, composition, properties and uses. **5**

OR iv. Describe the natural gas under following heads: Manufacturing, composition, properties and uses. **5**

******

Marking Scheme
FT3CO06 Fuel Technology

Q.1	i.	Which of the following type of coal has maximum carbon and calorific value? (a) Anthracite (Hard coal)		**1**
	ii.	India is the .....largest consumer of coal in the world. (b) Third		**1**
	iii.	Which gas has the least calorific value? (c) Producer gas		**1**
	iv.	An example of secondary fuel is: (d) Gobar gas		**1**
	v.	Biomass energy can be obtained from: (d) All of these		**1**
	vi.	Latex containing plants rich in hydrocarbons: (a) Petro crops		**1**
	vii.	Gasohol is a mixture: (a) Ethanol and gasoline		**1**
	viii.	The temperature of diesel engine ranges: (b) 293-340^{0}C		**1**
	ix.	Hydrogen fuel can be produced by .....process (b) Electrolysis		**1**
	x.	.....is added to odourless LPG for instantaneous detection of any leakage. (a) Ethyl Mercaptan		**1**
Q.2		Attempt any two:		
	i.	Reserves of coal in India	2.5 marks	**5**
		Reserves of coal in world	2.5 marks	
	ii.	Coal Analysation	1 mark	**5**
		Ultimate analysis of coal with their significance	4 marks	
	iii.	Fossil fuels	1 mark	**5**
		Types of coal	2 marks	
		Classification	1 mark	
		Their uses	1 mark	
Q.3	i.	Calculation of the gross calorific value	1.5 marks	**3**
		Calculation of net calorific value	1.5 marks	
	ii.	Carbonization	1 marks	**7**
		Types of carbonization process	2 marks	
		Otto-Hoffmann method with diagram	4 marks	
OR	iii.	Calculate minimum quantity of air required for complete combustion of 1m^3 of the fuel gas	2 marks	**7**
		Percentage of dry product of combustion by volume when 20% excess air is used.	4 marks	
		Calculate the volume of oxygen at 25^o C temperature and 750mm pressure.	1 mark	
Q.4	i.	Reserves of hydrocarbon in India	2 marks	**4**
		Reserves of hydrocarbon in world	2 marks	
	ii.	Cracking	1 mark	**6**
		Moving bed catalytic cracking	3 marks	
		Diagram	2 marks	
OR	iii.	Fractional distillation process	1 mark	**6**
		Petroleum refining and processing with diagram	3 marks	
		Their product and uses	2 marks	
Q.5	i.	Definition of Viscosity Index	1 mark	**2**
		Formula	1 mark	
	ii.	Any six difference between octane number and cetane number. 0.5 mark for each difference	(0.5 mark * 6)	**3**
	iii.	Write short note on:		**5**
		(a) AVL (Aviation liquid fuel)	2.5 marks	
		(b) Kerosene	2.5 marks	
OR	iv.	Write short note on:		**5**
		(a) Flash and fire point	2.5 marks	
		(b) Furnace oil	2.5 marks	
Q.6	i.	Reason why hydrogen cannot be used as fuel		**2**
	ii.	LPG	2 marks	**3**
		Its uses	1 mark	
	iii.	Describe the synthesis gas under following heads:		**5**
		Manufacturing	1 mark	
		Composition	1 mark	
		Properties	2 marks	
		Uses	1 mark	

OR	iv.	Describe the natural gas under following heads:		**5**
		Manufacturing	1 mark	
		Composition	1 mark	
		Properties	2 marks	
		Uses	1 mark	

******