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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Program: BBA (Oil & Gas)
Subject (Course): Gas Fundamental and Marketing
Course Code: BDSM 104
This paper has three sections.

Semester – V
Max. Marks : 100
Duration : 3 Hrs.

SECTION – A

Each question carries 10 marks

Max Marks – 50

Write Notes /Comments

	MARKS	CO
A.1. Explain the regasification process in details with diagram.	10	2
A.2. Explain the City gas evolution in India.	10	1
A.3. Describe the Energy Resources for CGD in India.	10	4
A.4. What are the benefits of CGD business?	10	1
A.5. Define the Regulatory Board and its Functions with Status in Indian CGD business scenario.	10	2

SECTION- B

Each question carries 10 marks each

Max Marks – 20

B.1. Fill in the blanks

Table 2 : Volume Conversion		MARKS	CO
1 US barrel (bbl)	.....Litres	2	3
1 US Gallon	.....Litres	2	3
1 Kilo Litre (KL)	.....bbl	2	3
1 US barrel (bbl)	.....Gallons	2	3
1 MBD (million barrels per day)	.....MMTPA	2	3

B.2. Fill in the blanks

Table 4 : Natural Gas Conversions			MARKS	CO
1 SCM (Standard Cubic Meter)	.....cubic metre @ 1 atmosphere pressure and 15.56 ° C		2	3
1 Cubic Metre	.....Cubic feet		2	3
1 BCM(Billion Cubic Metre) / Year of gas (consumption or production)	.....MMSCMD	365 Days a Year	2	3
1 TCF (Trillion Cubic Feet) of Gas Reserve	.....MMSCMD	100% Recoverable for 20 years @ 365 days/ annum)	2	3
1 MMTPA of LNG	.....MMSCMD	Molecular Weight of 18 @ 365 days/ annum)	2	3

SECTION- 3

Case Study

Max Marks – 30

Analysis of Natural Gas Demand & Availability from Various Sources

Currently most of India’s gas is produced from the western offshore fields which include South Bassein fields, Joint Venture fields of Tapti & Panna-Mukta and production of Associated Natural Gas from Mumbai High. The gas supplies from South Bassein fields and JV fields are fed into HBJ system for gas supply to Northern and North-western part of India including Gujarat.

The other onshore gas producing regions within the country are as follows:

Cambay Basin, Gujarat

Cauvery Basin

Krishna-Godavari Basin

North-Eastern region including Assam & Tripura

Rajasthan

Natural gas availability after deducting internal use of natural gas by gas producers, the average supply of natural gas from various sources to customers is as follows:

Producer	(MMscmd)
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ONGC	51
OIL	4
PMT JV consortium	10
Cairn Consortium	3.5
Other Private	3.5
Total	72

Around 18 MMSCMD of RLNG is being supplied over and above 72 MMSCMD, making the total availability of gas in the country to the extent of around 90 MMSCMD.

Further, DGH have projected natural gas availability in medium to long term. As per the projections made the current domestic availability of natural gas is likely to increase to around 152 MMSCMD in 2007-08 due to upcoming of various new sources such as RIL, Kochi LNG etc. However this availability is likely to decrease to around 130 MMSCMD in 2010-11 due to decline in gas availability from current largest domestic gas source i.e ONGC. It may be seen that the domestic gas availability from ONGC shall be decreasing from 53 MMSCMD in 2006-07 to around 30 MMSCMD by 2010-11. In order to bridge the growing deficit between gas demand and availability, GAIL is trying to import natural gas either in the form of LNG or through transnational pipelines. The likely availability of natural gas from these sources is as follows:

(MMSCMD)

Source	Quantity	Likely start Year
Iran, LNG	18	4th Qtr. 2009
Iran P/L	60 – 120	2010
Myanmar	28	-
ADGAS/Petronas/ Qatar/Australia	8 – 18	-
Total	114 – 184	

Since the gas availability from international sources is long term in nature, therefore it is envisaged that the total gas availability in the country by 2010-11 could be in the range of 244-314 MMSCMD.

Summary of Gas Availability (MMscmd) :

Source	Immediate	Medium Term (2007-09)	Long Term (2010-2011)
ONGC	51	50	30
OIL (Raj.+NE)	4	5	5
Sub Total	55	55	35

JV producers	17	53	59
LNG sources	18	30	36
Iran LNG	--	--	18
Transnational pipelines* : Iran and Myanmar	--	--	148
Other LNG sources*: Adgas, Petronas, Qatar. Australia	--	--	18
Total	90	138	314

Source: DGH/OIL/LTGP 2K

* Expected

Gas Demand

The power and fertilizer sectors have been core consumers of natural gas. These two sectors together consume about 70% of the gas today. The balance goes to industrial units where it replaces mostly liquid fuels. Gas is also supplied to the residential and the commercial sectors in Mumbai, Delhi and a few towns of Gujarat, Assam and Tripura. Over the past many years a number of gas demand projections have been made by various agencies.

Projections

A number of attempts have been made so far to estimate the future demand for gas. Although the figures do change every time the exercise is taken up, a trend of increasing demand far exceeding the supplies available from indigenous sources seems to have been well established. In a meeting taken by Secretary (P&NG) on 29.04.2005 regarding projected demand of natural gas in medium to long term. The meeting was attended by officials from Ministries of respective consumer industries viz. Power, Fertilizer, Steel, etc. and experts from other companies/agencies involved in gas business. The demand of natural gas as assessed is provided below:

Immediate/Medium term requirement (say 2007-08)

(MMSCMD)

Sector	Shortfall	Conversion	Additional	Total
Fertilizer	11.19	12.99	-	24.18
Power	18	-	21.42	39.42
Steel	3		-	3
Industrial*			12.69	12.69
City gas*			6.81	6.81
Total	32.19	12.99	40.92	86.1

* Note: It is assumed that the immediate/Medium term requirement for Industrial and City gas sector shall be 50% of the total projected demand of gas, as assessed by MoP&NG, for the industrial & city gas distribution projects i.e 25.37 & 13.61 MMSCMD respectively in 2009-10.

The above gas demand was considered in addition to the existing gas supply of around 99 MMSCMD to various sectors in the country. Therefore, it was estimated that the total gas demand in the country in the immediate/Medium term requirement could be 185.1 MMSCMD, i.e. around 185 MMSCMD. However, it was also considered that the demand could be lower if the delivered price of natural gas is increased from \$ 3.0 MMBTU to \$5.0 MMBTU.

Long term requirement (say 2010-11)

(MMSCMD)

Sector	Shortfall	Conversion	Additional	Total
Fertilizer	11.19	22.41	-	33.6
Power	18	6	124.42	148.42
Steel	3		4	7
Industrial			25.37	25.37
City gas			13.61	13.61
Total	32.19	28.41	167.4	228

Thus, the total gas demand in the country in the long term could be 327 MMSCMD (i.e. current supply of 99 MMSCM plus new demand of 228 MMSCMD).

Estimated Demand at US\$ 4.0/ MMBTU

(MMSCMD)

Sector	2005-06	2008-09	2011-12
Power	85.68	159.55	182.11
Fertilizer	43.76	57.18	61.98
Industrial	45.17	52.87	61.8
Domestic + Commercial + Automobile	5.66	7.43	9.92
Total	180.26	277.03	315.81

However, the demand of natural gas goes down significantly if the price of natural gas/RLNG is increased by \$1/MMBTU. The demand of natural gas , as assessed by independent agency (MDRA) @ price of \$5.0/MMBTU is as follows:

Estimated Demand at US\$ 5.0/MMBTU

(MMSCMD)

Sector	2005-06	2008-09	2011-12
Power	0	0	0
Fertilizer	0	0	0
Industrial	45.17	52.87	61.8
Domestic + Commercial + Automobile	5.66	7.43	9.92
Total	50.83	60.3	71.72

Total domestic production of natural gas is to the extent of around 72 MMSCMD. Further around RLNG to extent of around 18 MMSCMD is available from PLL-Dahej and Shell-Hazira.

Further, current domestic availability of natural gas from largest domestic source i.e ONGC is projected to decrease from 53 MMSCMD to around 30 MMSCMD by 2010-11. This shall be offset from increase in domestic availability from private gas sources such as RIL and other NELP fields.

Import of natural gas in the form of LNG and through transnational pipelines would be major sources of gas availability. Taking all the above into account, the total gas availability in the country shall increase to around 244 - 314 MMSCMD by 2010-11.

As against the total gas availability of around 244 - 314 MMSCMD by 2010-11, the total projected demand of natural gas will be 327 MMSCMD by 2010-11. However, In the medium term i.e. 2007-08 it is estimated that as against the total demand of around 185 MMSCMD, the gas availability in the country shall be only around 152 MMSCMD.

Questions:-

	MARKS	CO
Q1. Please mention the ten problems in Indian natural gas sector which we are facing in present scenario.	10	4
Q2. What are the options with India to build up a methanol base economy?	10	1
Q3. Build up the Demand vs. Supply analysis as per above scenario.	10	2