UNIVERSITY OF PUNE

[4364]-691

B. E. (Petroleum) Examination - 2013

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

ELECTIVE-II (*2008* Course)

[Total No. of Questions: *12*] **[Total No. of Printed Pages :2]**

[Time : *3* **Hours]** **[Max. Marks : 100]**

Instructions :

(1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section-I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q. 12 from Section-II

(2) Answers to the ***two sections*** *should be written in* ***separate answer-books****.*

(3) Neat diagram must be drawn wherever necessary.

(4) Black figures to the right indicate full marks.

(5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(6) Assume suitable data, if necessary.

SECTION-I

Q1	A	List the various green house gases and describe their damaging effect to the environment in brief	6
	B	Write the objective of Kyoto Protocol to stabilize green house gas concentration in the atmosphere?	6
	C	Explain the role of developed countries to control global warming and achieve sustainable development?	6
		OR	
Q2	A	Explain with example carbon credit and related trading in brief	10
	B	Discuss the expectations from Developing Countries to reduce GHG Emission?	8
Q3	A	Explain the impact of methane gas on global warming	8
	B	Explain ‚emission estimation' using any one example	8
		OR	
Q4	A	List the major and minor industrial sectors responsible for carbon emission. Give the details of operations involved in it and explain the following in brief, for these industrial activities	16
	1)	Sources of emission	
	2)	various ways of carbon management	

Q5		Describe any one case study on „Carbon dioxide storage into depleted oil reservoirs to reduce CO_2 emissions'. Discuss in brief available data, objectives, challenges, advantages and scope involved in this kind of project.	16
		OR	
Q6	A	Describe any one method of carbon sequestration and write the principle of its operation in brief.	8
	B	Explain carbon cycle in brief.	8

SECTION-II

Q7		Explain in brief the working of any two methods of renewable energy resources	18
		OR	
Q8		What is sustainable development? Discuss in detail important considerations to be taken in account for a project on sustainable development. Also write its long term advantages.	18
Q9		Why Biomass is considered as a "green" technology? How biomass can provide consistence supply of the required energy through biogas, biodiesel, and by directly burning the biomass'? write various methods of manufacturing biofuels.	16
Q10		Discuss in detail scope, status, challenges and application renewable energy for India.	16
Q11		Discuss the following methods to reduce CO_2 footprint.	16
	A	Energy efficient processes.	
	B	Capture and storage of CO_2 in coal beds	
	C	Develops alternative sources of energy	
	D	To minimize energy consumption and losses	

OR

Q12		What is CDM? Explain in detail any two ongoing CDM Projects or Processes in India along with their advantages. Also list other such areas where there is scope for this technology	16

UNIVERSITY OF PUNE
[4364]-683
B. E. (Semester - I) Examination - 2009
WELL ENGINEERING AND DESIGN
(2008 Pattern)

Total No. of Questions : 8 **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) Question Nos. 1 and 5 are compulsory. Out of the remaining attempt 2 question from section 1 and 2 question from section 2.
*(2) Answers to the **two sections** should be written in **separate answer-books**.*
(3) Black figures to the right indicate full marks.
(4) Neat diagrams must be drawn wherever necessary.
(5) Use of logarithmic tables, slide rule, Molliercharts, electronic pocket calculator and steam tables is allowed.
(6) Assume suitable data, if necessary.

SECTION-1

Q. 1. a) What is GTO? Discuss Input data required for preparation of drilling Program. (10)

b) Discuss casing shoe depth selection procedure in detail. (8)

Q. 2. a) Using following co-ordinate find measure depth of L shape directional Well. (8)

Slot co-ordinate 15.32 ft N, 5.06 ft E
Target co-ordinate 1650 ft N, 4510 ft E
TVD target = 9880ft
Build up rate 1.5˚ per 100 ft

b) Write short notes on (8)

1) MWD Tool
2) Reactive torque

Q. 3. a) What are different well control methods, discuss any one in detail. (8)

b) A well is being drilled at 8700 feet with 12ppg last casing 9-5/8" was lowered at 7000 ft TVD LOT was conducted after drilling 9-5/8" shoe and leak-off pressure was 2000 psi with 11 ppg mud Burst rating of (8)

9-5/8" casing is 6874 psi. well head and BOP stack rating is 5000 psi. At 9000 feet a reservoir pressure of 6000 psi is expected. Calculate.

i. Static BHP at 8700 feet
ii. Calculating BHP at 8700 feet, ECD assuming friction loss 100 psi.
iii. Calculate MAASP with 12ppg mud.
iv. Mud density required prior to opening reservoir at 9000 feet, if minimum of 200 psi of overbalance is to be maintained. Also calculate mud gradient.

Q. 4. a) Casing size 13 - $^{3}/_{8}$" ,Depth 2500M Mud weight 1.3 gm/cc, depth of next phase =4000M formation pressure gradient in next phase =1.5 gm/cc fracture pressure gradient at 2500M = 2.20 gm/cc. calculate collapse pr and Burst pressure using conventional method. (8)

b) Write short note on (8)

i. Min curvature method
ii. Snubbing

SECTION-2

Q. 5. a) A 3 - $^{1}/_{2}$" drill pipe , 13.3.ppf grade s135 premium class is used to run 4.5 inch liner to 21,000 ft if the length of drill pipe is 17500 ft, Mud weight is 120 PCF, total weight of liner is 50,000 lb calculate stretch in drill pipe. (6)

b) Discuss in brief API classification and MOP to decide the length of drill pipe. (6)

c) Discuss effect of dogleg seventy on drill pipe in directional well. (6)

Q. 6. a) Discuss different pressure drops in a drill string and explain the importance of HSI and Jet impact in detail. (8)

b) Write short notes (8)

i. Cutting short notes
ii. Surge pressure

Q . 7. a) Discuss important of cost analysis and predication of AFE calculations. in well planning. (8)

b) Explain liner cementation with suitable sketch in detail. (8)

Q. 8. a) A 10,000 ft string of casing is hung in 12ppg mud. The top 4000ft are 43.5 ppf $9^5/_8$" casing, bottom section 47 ppf $9^5/_8$" calculate tension load. (8)

Area of 43.5 ppf pipe is 12.559 $inch^2$

Area of 47 ppf is pipe is 1.572 $inch^2$

b) Write short notes on (8)

i. Cement sheology

ii. Optimization of bit hydraulics

PUNE UNIVERSITY

[4364]-668

B. E. (Petroleum) Engineering

Examination - 2013

Petroleum Refining Technology

(Elective II) (2008 Course)

Total No. of Questions : 12 **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **any three** questions from each section.*

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Figures to the right indicate full marks.

(5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(6) Assume suitable data, if necessary.

SECTION-I

Q. 1.A) Explain in detail the composition of crude oil. (8)

B) What are the various low boiling products of a refinery? (6)

C) Define: i) Cloud Point ii) Flash point (4)

OR

Q. 2. A) Write a short note on the methods of determining carbon residue in crude oil. (8)

B) Give the significance of ASTM distillation of petroleum products. (4)

C) Explain the process of formation of petroleum. (6)

Q. 3. A) Describe in detail the following types of reflux in the atmospheric distillation column: i) Top tray reflux ii) Pump around reflux (8)

B) Describe the single stage and double stage electrostatic process for the desalting of crude oil. (8)

OR

Q. 4. A) Explain the need for vacuum distillation of crude oil. Give the process conditions for the vacuum distillation unit. How is vacuum obtained? (8)

B) Explain the importance of the auxillary equipment in efficient functioning of the refinery distillation unit. (8)

Q. 5. A) Give the necessity of delayed coking and hence explain the process. (8)

B) Explain with the help of a neat diagram, the role regenerator in the FCC. (8)

Q. 6. A) Enlist the various commercially used hydrocracking processes. Explain any one in detail. (8)

B) Explain the process of flexi coking. Compare the coke yield with other process. (8)

SECTION-II

Q. 7. A) Explain the semi-regenerative process for catalytic reforming. (8)

B) Define the term alkylation. Hence with a neat labeled diagram, Explain the process of HF alkylation. (8)

OR

Q. 8. A) Give the significance of isomerisation process. Describe the process isomerisation. (8)

B) Discuss how the various catalyst affect the reforming process. (8)

Q. 9. A) Explain the necessity of dewaxing of lube oil. Discuss the ketone dewaxing process. (8)

B) Why is propane a preferred solvent in the deasphalting of lube oil base stock? (4)

C) What are dewaxing aids? Enlist a few. (4)

OR

Q. 10. A) Write a note on the additives of gasoline, diesel and kerosene. (8)

B) Write a note on the effect of asphaltenes and resins on the properties of lube oil. (8)

OR

Q. 11. A) Explain in brief the various methods of production of hydrogen in a refinery. (10)

B) Discuss the various treatment methods of waste water in the refineries. (8)

OR

Q. 12. A) Discuss the once through claus process for sulphur recovery from refinery gases. (10)

B) Write a note on batch blending and the line blending process for the various refinery products. (8)

UNIVERSITY OF PUNE

[4364]-684

B. E. (Petroleum Engineering)

Petroleum Exploration

(2008 Pattern)

Total No. of Questions : 12 **[Total No. of Printed Pages :2]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answers to the **two sections** should be written in **separate answer-books**.*

(2) Neat diagram must be drawn wherever necessary.

(3) Attempt any three question from Section-I and Section-II.

(4) Figures to the right indicate full marks.

SECTION-I

Q1.

A) Explain the use of Gravity survey in Petroleum Exploration [6]

B) Draw and explain the magnetic Anomaly of uniformly magnetized sphere and a horizontal Slab with vertical fault. [9]

OR

Q2.

A) Describe the working of Warden Gravimeter with diagram. [8]

B) Explain the working of Fluxgate magnetometer with suitable diagram. [7]

Q3.

A) What is Lateral Profiling Method? Explain with the help of Wenner and Schlumberger arrangements? [9]

B) How isotope surveys are useful in geochemical exploration of petroleum? [6]

OR

Q4.

A) What is Vertical Electrical Sounding? Explain with the help of Wenner and Schlumberger arrangements? [6]

B) Discuss the use of half life period of radioactive elements in the radioactive survey. Explain the use of Geiger Muller Counter in Radioactive survey [9]

Q5.

A) Describe in brief the micro seepages of hydrocarbons [10]

B) What are the different geochemical parameters used to study the crude oil [10]

OR

Q6.

A) What is the procedure adopted to carry out the geochemical survey. [10]

B) What are the different modes of transport of hydrocarbons through the seal of the reservoir to the surface? [10]

SECTION-II

Q7.

A) What are primary reflections and multiple reflections? Explain the concept using suitable diagram. [8]

B) What is CDP shooting method? Discuss the CDP shooting in marine conditions [7]

OR

Q8.

A) Explain in brief the concept of dynamic and static correction. [8]

B) What is 3D land acquisition method? [7]

Q9.

A) What is synthetic seismogram? Discuss the advantages and disadvantages of the synthetic seismogram [8]

B) Explain in brief concept of dim spot and bright spot [7]

OR

Q10.

A) What is a time lapse seismic monitoring? [8]

B) What is seismic Stratigraphy [7]

Q11.

A) Write a short note on reserves nomenclature as recommended by SPE and WPC. Discuss the concept of prognosticated reserves. [10]

B) What are the unconventional hydrocarbon resources? [10]

OR

Q12.

A) What strategies are to be adopted for exploration in stratigraphic traps? [10]

B) Explain the deterministic and probabilistic approach in risk analysis [10]

UNIVERSITY OF PUNE
[4364]-681
B. E.(Petroleum Engineering)Examination - 2013
RESERVOIR ENGINEERING-II(412381)
(2008 Pattern)

[Total No. of Questions:] **[Total No. of Printed Pages :4]**
[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) Answer ***any three*** *from each section.*
(2) Answers to the ***two sections*** *should be written in* ***separate answer-books****.*
(3) Black figures to the right indicate full marks.
(4) Neat diagrams must be drawn wherever necessary.
(5) Use of non-programmable calculator, log-log and semi-log paper is allowed.
(6) Assume suitable data, if necessary.
(7) ***Questions no2 and8 are compulsory.***

SECTION-I

Q1 a) What do you mean by DST? How is it different from a PBU and DD test? [6]

b) Draw the various regimes/phases which are seen on a DST plot. [10]

Q2 Yuzor operating company has drilled a discovery well in Aesthea formation. The three phases that exist in the formation are oil, water and gas, with oil being the only mobile phase. The following information is given: [18]

Depth = 4356 ft; P_i =950 psi; Porosity=12%; γ_o =32.5 deg API; $S_{w=}$ 18% S_g =16%, S_o =66%; μ_o =1.17 cp; R_{so} =226 scf/STB; s=0; h=22 ft; r_w =9 in; k=35.5 md; γ_g=0.893; c_w=2.6x10^{-5} psi^{-1}; c_g=1.188 x 10^{-3} psi^{-1} ;
c_o= 4.23 x 10^{-4} psi^{-1} ; c_f= 5x10-6 psi^{-1} ; B_o= 1.146 RB/STB; q=165stb/d
calculate (use the Ei function values):

a. the pressure at the wellbore, when the well has been producing for 1 hr
b. the pressure 10 ft from the center of the wellbore, after 1 hr
c. the pressure 100 ft from the center of the wellbore, after 1hr

Q3 a) What do you mean by ETR, MTR and LTR? Explain with figures. [4]

b) What are the different types of flow regimes that you see in a typical horizontal welltest derivative plot? [4]

c) Draw pressure diagnostic plots for 5 types of reservoir conditions commonly encountered. [8]

Q4 a) Derive the continuity equation for a single phase fluid flowing though a one dimensional porous media, in Cartesian coordinates. [6]

b) Derive the diffusive equation in Cartesian coordinates. [10]

SECTION-II

Q5 Explain the procedure for analyzing a horizontal well test [16]

Q6 Explain the procedure for analyzing a gas well test using pseudo pressure. [16]

Q7 Explain decline curves. [16]

Q8 Write short notes on (any three) [18]

a. Fetkovich Decline Curve
b. Isochronal well test
c. Diagnostic plot for a horizontal well
d. Type curve for gas wells

Formulas for the exam

For E (i) function values, refer to the table given with the examination paper

$$p = p_i + 70.6\frac{qB\mu}{kh}\ \text{Ei}\left(-\frac{948\emptyset\mu c_t r^2}{kt}\right)$$

$$t_D = \frac{0.000264kt}{\emptyset\mu_0 c_t r_w^2}$$

$$p_{ws} = p_i - \frac{162.6q_0\mu_0\beta_0}{kh}\log\left[\frac{t_p + \Delta t}{\Delta t}\right]$$

$$p_D = -\frac{1}{2}\,\text{Ei}\left(-\frac{r_D^2}{4t_d}\right)$$

$$\text{S} = 1.151\left[\frac{p_{1\,hr} - p_{ws\,(\Delta t=0)}}{m} - \log\left(\frac{k}{\emptyset\mu_0 c_t r_w^2}\right) - 3.23\right]$$

$$p_{wf} = p_i - \frac{162.6q_0\mu_{0\beta_0}}{kh}\left[\log t + \log\left(\frac{k}{\emptyset\mu_0 c^t r_w^2}\right) - 3.23 + 0.869s\right]$$

$$p = p_i + 70.6\frac{qB_\mu}{kh}\left[\ln\left(\frac{1{,}688\emptyset\mu c_t r^2}{kt}\right)\right]$$

$$\frac{(3.975\times10^5)\emptyset\mu c_t r_w^2}{k} < t < \frac{948\emptyset\mu c_t r_e^t}{k}$$

$$p_{1h} = p_i + m\left[\log\left(\frac{k}{\emptyset\mu_0\beta_0 c_t r_w^2}\right) - 3.23 + 0.869s\right]$$

$$\text{p(r,t)} = \text{LS(r,t)} = p_i - \frac{70.6\,Q\mu}{k\,h}\left[-E_i\left(-\frac{948.1\,\Phi\,\mu\,c_t r^2}{k\,t}\right)\right]$$

$$\text{k} = \frac{162.6\,q_0\mu_0\beta_0}{mh}$$

TABLE 1.1—VALUES OF THE EXPONENTIAL INTEGRAL, $-E(-x)$

$-E_1(-x)$, $0.000 < x < 0.209$, interval = 0.001

x	0	1	2	3	4	5	6	7	8	9
0.00	$+\infty$	6.332	5.639	5.235	4.948	4.726	4.545	4.392	4.259	4.142
0.01	4.038	3.944	3.858	3.779	3.705	3.637	3.574	3.514	3.458	3.405
0.02	3.355	3.307	3.261	3.218	3.176	3.137	3.098	3.062	3.026	2.992
0.03	2.959	2.927	2.897	2.867	2.838	2.810	2.783	2.756	2.731	2.706
0.04	2.681	2.658	2.634	2.612	2.590	2.568	2.547	2.527	2.507	2.487
0.05	2.468	2.449	2.431	2.413	2.396	2.377	2.360	2.344	2.327	2.311
0.06	2.296	2.279	2.264	2.249	2.235	2.220	2.206	2.192	2.178	2.164
0.07	2.151	2.138	2.125	2.112	2.099	2.087	2.074	2.062	2.050	2.039
0.08	2.027	2.015	2.004	1.993	1.982	1.971	1.960	1.950	1.939	1.929
0.09	1.919	1.909	1.899	1.889	1.879	1.869	1.860	1.850	1.841	1.832
0.10	1.823	1.814	1.805	1.796	1.788	1.779	1.770	1.762	1.754	1.745
0.11	1.737	1.729	1.721	1.713	1.705	1.697	1.689	1.682	1.674	1.667
0.12	1.660	1.652	1.645	1.638	1.631	1.623	1.616	1.609	1.603	1.596
0.13	1.589	1.582	1.576	1.569	1.562	1.556	1.549	1.543	1.537	1.530
0.14	1.524	1.518	1.512	1.506	1.500	1.494	1.488	1.482	1.476	1.470
0.15	1.464	1.459	1.453	1.447	1.442	1.436	1.431	1.425	1.420	1.415
0.16	1.409	1.404	1.399	1.393	1.388	1.383	1.378	1.373	1.368	1.363
0.17	1.358	1.353	1.348	1.343	1.338	1.333	1.329	1.324	1.319	1.314
0.18	1.310	1.305	1.301	1.296	1.291	1.287	1.282	1.278	1.274	1.269
0.19	1.265	1.261	1.256	1.252	1.248	1.243	1.239	1.236	1.231	1.227
0.20	1.223	1.219	1.215	1.210	1.206	1.202	1.198	1.195	1.191	1.187

$-E_1(-x)$, $0.00 < x < 2.09$, interval = 0.01

x	0	1	2	3	4	5	6	7	8	9
0.0	$+\infty$	4.038	3.335	2.959	2.681	2.468	2.295	2.151	2.027	1.919
0.1	1.823	1.737	1.660	1.589	1.524	1.464	1.409	1.358	1.309	1.265
0.2	1.223	1.183	1.145	1.110	1.076	1.044	1.014	0.985	0.957	0.931
0.3	0.906	0.882	0.858	0.836	0.815	0.794	0.774	0.755	0.737	0.719
0.4	0.702	0.686	0.670	0.655	0.640	0.625	0.611	0.598	0.585	0.572
0.5	0.560	0.548	0.536	0.525	0.514	0.503	0.493	0.483	0.473	0.464
0.6	0.454	0.445	0.437	0.428	0.420	0.412	0.404	0.396	0.388	0.381
0.7	0.374	0.367	0.360	0.353	0.347	0.340	0.334	0.328	0.322	0.316
0.8	0.311	0.305	0.300	0.295	0.289	0.284	0.279	0.274	0.269	0.265
0.9	0.260	0.256	0.251	0.247	0.243	0.239	0.235	0.231	0.227	0.223
1.0	0.219	0.216	0.212	0.209	0.205	0.202	0.198	0.195	0.192	0.189
1.1	0.186	0.183	0.180	0.177	0.174	0.172	0.169	0.166	0.164	0.161
1.2	0.158	0.156	0.153	0.151	0.149	0.146	0.144	0.142	0.140	0.138
1.3	0.135	0.133	0.131	0.129	0.127	0.125	0.124	0.122	0.120	0.118
1.4	0.116	0.114	0.113	0.111	0.109	0.108	0.106	0.105	0.103	0.102
1.5	0.100	0.0985	0.0971	0.0957	0.0943	0.0929	0.0915	0.0902	0.0889	0.0876
1.6	0.0863	0.0851	0.0838	0.0826	0.0814	0.0802	0.0791	0.0780	0.0768	0.0757
1.7	0.0747	0.0736	0.0725	0.0715	0.0705	0.0695	0.0685	0.0675	0.0666	0.0656
1.8	0.0647	0.0638	0.0629	0.0620	0.0612	0.0603	0.0595	0.0586	0.0578	0.0570
1.9	0.0562	0.0554	0.0546	0.0539	0.0531	0.0524	0.0517	0.0510	0.0503	0.0496
2.0	0.0489	0.0482	0.0476	0.0469	0.0463	0.0456	0.0450	0.0444	0.0438	0.0432

$-E_1(-x)$, $2.0 < x < 10.9$, interval = 0.1

x	0	1	2	3	4	5	6	7	8	9
2	4.89×10^{-2}	4.26×10^{-2}	3.72×10^{-2}	3.25×10^{-2}	2.84×10^{-2}	2.49×10^{-2}	2.19×10^{-2}	1.92×10^{-2}	1.69×10^{-2}	1.48×10^{-2}
3	1.30×10^{-2}	1.15×10^{-2}	1.01×10^{-2}	8.94×10^{-3}	7.89×10^{-3}	6.97×10^{-3}	6.16×10^{-3}	5.45×10^{-3}	4.82×10^{-3}	4.27×10^{-3}
4	3.78×10^{-3}	3.35×10^{-3}	2.97×10^{-3}	2.64×10^{-3}	2.34×10^{-3}	2.07×10^{-3}	1.84×10^{-3}	1.64×10^{-3}	1.45×10^{-3}	1.29×10^{-3}
5	1.15×10^{-3}	1.02×10^{-3}	9.08×10^{-4}	8.09×10^{-4}	7.19×10^{-4}	6.41×10^{-4}	5.71×10^{-4}	5.09×10^{-4}	4.53×10^{-4}	4.04×10^{-4}
6	3.60×10^{-4}	3.21×10^{-4}	2.86×10^{-4}	2.55×10^{-4}	2.28×10^{-4}	2.03×10^{-4}	1.82×10^{-4}	1.62×10^{-4}	1.45×10^{-4}	1.29×10^{-4}
7	1.15×10^{-4}	1.03×10^{-4}	9.22×10^{-5}	8.24×10^{-5}	7.38×10^{-5}	6.58×10^{-5}	5.89×10^{-5}	5.26×10^{-5}	4.71×10^{-5}	4.21×10^{-5}
8	3.77×10^{-5}	3.37×10^{-5}	3.02×10^{-5}	2.70×10^{-5}	2.42×10^{-5}	2.16×10^{-5}	1.94×10^{-5}	1.73×10^{-5}	1.55×10^{-5}	1.39×10^{-5}
9	1.24×10^{-5}	1.11×10^{-5}	9.99×10^{-6}	8.95×10^{-6}	8.02×10^{-6}	7.18×10^{-6}	6.44×10^{-6}	5.77×10^{-6}	5.17×10^{-6}	4.64×10^{-6}
10	4.15×10^{-6}	3.73×10^{-6}	3.34×10^{-6}	3.00×10^{-6}	2.68×10^{-6}	2.41×10^{-6}	2.16×10^{-6}	1.94×10^{-6}	1.74×10^{-6}	1.56×10^{-6}

UNIVERSITY OF PUNE

[4364]-682

B. E.(Petroleum Engineering) Examination - 2013

PETROLEUM FORMATION EVALUATION

(2008 Pattern)

[Total No. of Questions:10] **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) Answers to the questions of both the sections should be written in separate answer books.

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Neat diagrams must be drawn wherever necessary.

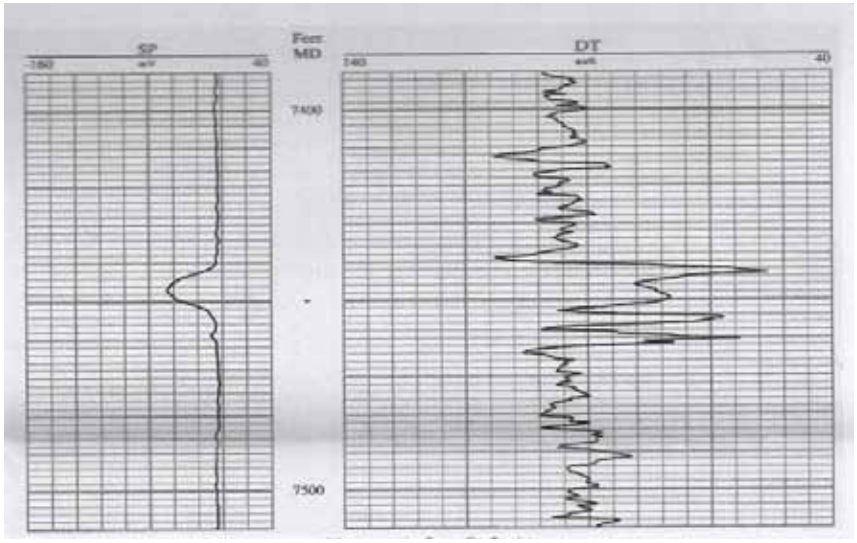
(4) Assume additional data, if necessary.

SECTION-I

Q1 Draw and explain resistivity profiles for three versions of fluid distributions in the vicinity of borehole. [15]

OR

Q2 a) Log given below shows record for SP and DT for every two feet. Interpret the changes by log from 7440 feet to 7464 feet by comparing the SP curve and DT. [10]

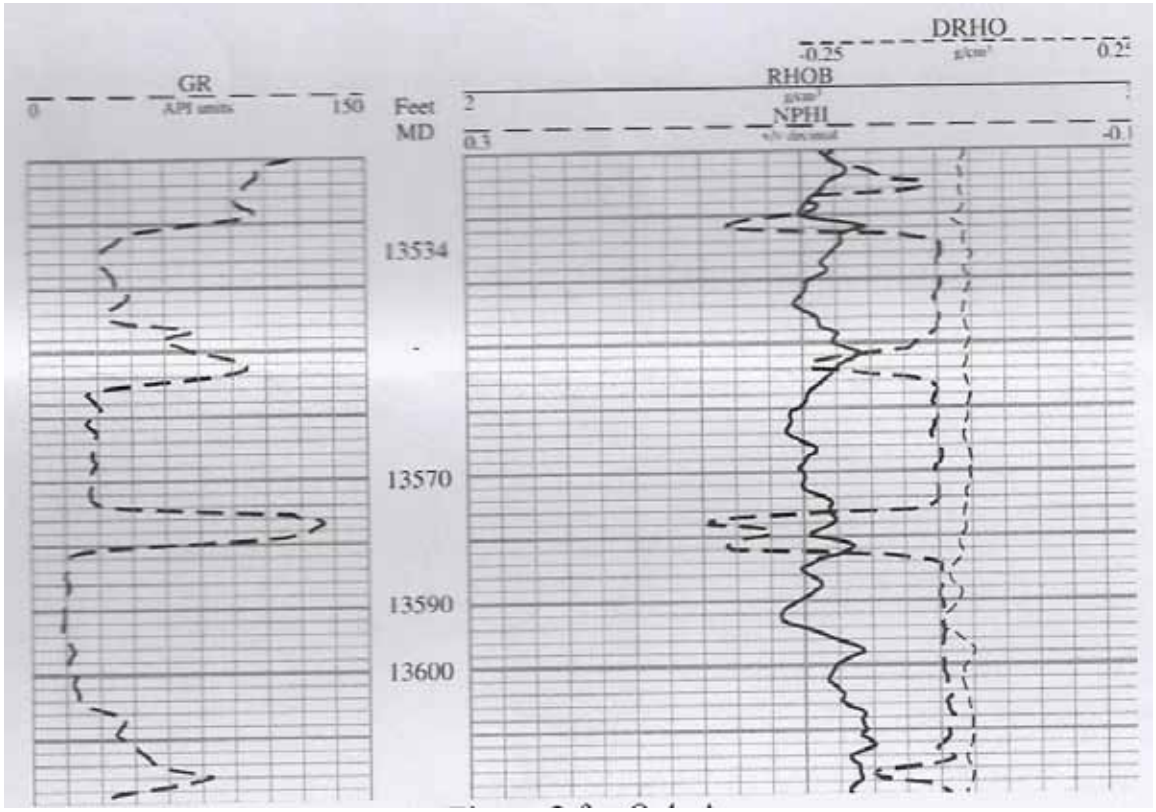


b) Why it is important to know lithology of a zone in log analysis? [5]

Q3 Describe the principles and tools used in 'natural gamma ray logs.' [15]

OR

Q4 a) A record of logs is given in figure 2. Track 1 is a record of gamma ray. While track 2 represents bulk density (RHOB), Neutron porosity (NPHI) and density correction (DRHO). Interpret the curves between 13534 feet and 13600 feet. What is shalyness in the figure? Establish the relationship between density and porosity with low gamma ray values. [10]



b) What is net to gross ratio? Explain with a neat diagram [5]

Q5 Answer **<u>any four</u>** of the following [20]

a) What is a clean formation?

b) Abnormal pressure

c) Cross plots

d) Temperature logging.

e) Depth of investigation of various resistivity tools.

f) Electrical properties of clay

g) Importance of examination of well cuttings and core analysis

h) Logging while drilling

SECTION-II

Q6 How will you recognize various depositional environments using log derived data? [15]

OR

Q7 How are various SP log curve 'Shapes' classified on the basis of pattern? [15]

Q8 How will you detect and interpret oil and gas shows during mud logging? [15]

OR

Q9 How will you interpret porosity and presence of hydrocarbons on logs?(State clearly which logs will be required in each cases) [15]

Q10 Answer **any four** from the following [20]

a. Explain the empirical relationship between water resistivity, porosity and water saturation.

b. How are fractured reservoir detected?

c. Recognition of porous and non-porous carbonates

d. Recognition of oil-water contact

e. Image logs

f. Geosteering

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UNIVERSITY OF PUNE

[4364-685]

B.E. (Petroleum) Examination-2013

ADVANCED INSTRUMENTION AND PROCESS CONTROL IN PETROLEUM INDUSTRY

(Elective - I) (2008 pattern)

Time-Three hours **Maximum Marks=100**

[Total No. of Question=12] **[Total no. of printed pages= 4]**

Instructions:

(1)Answer 3 questions from Section-I. Answer question 3 from Section-II,

(2)Answers to the two sections should be written in separate answer books.

(3)Figures to the right indicate full marks.

(4)Use of logarithmic tables slide rule,Mollier charts,electronic pocket calculator and steam tables is allowed.

(5)Assume suitable data, if necessary.

SECTION-I

Q.1 (a)Give examples of analog instruments and briefly cite their field applications. (8)

(b)How an analog signal can be converted to digital format -Explain with the help of neat diagram. (8)

OR

Q.2 (a)With help of neat diagram discuss hazardous area classification for the conventional Drilling Rig. (6)

(b)Name various types of Gates and Circuits used frequently in Oil and Gas Industries. (4)

(c)Why knowledge of Instrumentation and Control are essential for practicing Petroleum Engineers. (6)

Q.3 (a)With help of neat diagram explain working principle of Diaphragm Gauge. (6)

(b)Compare the performance of RTD and Thermocouple. (4)

(c)Discuss the Air Bubbler Method for measurement of level of a closed tank. (6)

OR

Q.4 (a)Explain the construction and working of Vapor Pressure Thermometer in details. Discuss its advantages and disadvantages. (8)

(b)With help of neat sketch explain operational procedure of Wheel Flow Meter. Highlight the material of construction. (8)

Q.5 (a)What do you mean by dynamics and what is steady state? (4)

(b)With help of neat diagram explain various possibilities of 2^{nd} order system. In this context explain the following. (10)

(i)Overshoot (ii)Decay ratio (ii)Damping Factor

Provide example of 2^{nd} order system.

(c)Discuss P, I and D actions of a standard PID Controller. (4)

OR

Q.6 (a)Discuss the choice of Controllers for (6)

(i)Crude Flow Monitoring across Cross Country Pipeline.

(ii)Vapor Pressure Control and Monitoring inside a Tank.

(b)Differentiate between PLV, DCS and PC-based Control System. (8)

(c)With help of neat diagram explain Gain and Time constant for first order systems. (4)

SECTION_II

Q.7 (a)Discuss Cascade Control with help of neat diagram. (6)

(b)Discuss the merits and usefulness of Feed-forward and feed-back Control loops. (6)

(c)Explain the need of Oilfield Automation and discuss its present status. (6)

OR

Q.8 (a)With the help of neat diagram explain control of a two phase oil gas separator. (6)

(b)What are design goals of automatic remotely controlled fracturing processes-explain with the help of neat diagram. (6)

(c)Name type of controller to be employed for following purposes: (6)

(i)Flow Control

(ii)Temperature Control

(iii)Level Control

Q.9 (a)With the help of suitable example explain Managed Pressure Drilling(MPD). (8)

(b)Discuss the dynamic positioning of Floating Vessels in deep sea operations. Explain with help of cascade control diagram. (8)

OR

Q.10 (a)Explain the Control Scheme of a production well along with the suitable sensors and control logic. (8)

(b)With help of suitable example explain SCADA strategy for UBD operation. (8)

Q.11 (a)Multiphase Flow Control is a challenging task-Explain with help of suitable example. How is it practices in upstream industry? (8)

(b)Discuss in details the subsea operations and its dependence on modern day control architecture. (8)

OR

Q.12 Write a short note on (any three) (16)

(i)Control of Stream Injection Processes

(ii)Sand Control and Monitoring Strategy

(iii)Emergency Shutdown Logic

(iv)Integrated Flow Assurance Systems.

UNIVERSITY OF PUNE

[4364]-690

B. E. (Petroleum Engg) Examination - 2013

Non-Conventional Hydrocarbon Resources

(2008 Pattern)

[Total No. of Questions: *n*] **[Total No. of Printed Pages :***3*]

[Time : *3* **Hours]** **[Max. Marks : 100]**

Instructions :

(1) Answers to the ***two sections*** *should be written in* ***separate answer-books****.*

(2) Figures to the right indicate full marks.

(3) Neat diagrams must be drawn whenever necessary.

(4) Assume suitable data, if necessary.

Section I

Q1		What is a Petroleum Geosystem? How is the concept applicable to continuous accumulation system?	15
		OR	
Q2	A	Explain the following terms: Heavy and extra heavy oil, Natural bitumen, Shale oil, Tar sand, and tight reservoirs.	10
	B	Differentiate between shaly and sandy shale.	05

Q3. A Following mineralogical variation is observed during detailed petrophysical studies of the potential shale horizon. 06

No.	Depth in meters	Mineralogy percent			
		Quartz	Carbonate	Clay minerals	Others
1.	2500 m	22	20	52	06
2.	2510	20	17	53	10
3.	2520	16	12	66	06
4.	2530	49	10	36	05
5.	2540	56	12	25	07
6.	2550	58	10	27	05

Evaluate behavior of shale for given depths to understand brittleness. Give justification. What additional information is required to realize potential of the horizon?

B How gas recovery is calculated in CBM using Langmuir isotherm? 09

OR

Q4 A A gas has a specific gravity of 0.75 and exists at 70◦F. What would be the pressure above which hydrates could be expected to form? 05

B Draw a Schematic diagram of CBM reservoir to understand heterogeneity. How does it different from Shale Gas? 10

Q5 A Answer any four from the following: 20

1. TOC% in Tight Gas sand, shale gas and CBM
2. Reservoir modeling in shale gas reservoir
3. Gas desorption and diffusion process
4. Gasification
5. Porosity in shale and CBM
6. Carbon Capture and Sequestration
7. Gas to Liquid

Section II

Q6 A Discuss CBM field development and planning in detail. 10

B How is hardness of rock depending on Poission's ratio? 05

OR

Q7	A	Explain in brief different types of proppant ant their function in hydraulic fracturing.	10
	B	Write in brief on Deliverability and drainage efficiency in CBM.	05
Q8	A	Describe environmental problems related to drilling and production operations.	10
	B	Describe in detail inhibition of hydrate formation.	05
		OR	
Q9	A	Explain the failure envelop in normal stress-shear stress a rock in detail.	10
	B	Write in brief about Pressure drop in skin zone in vertical and horizontal well.	05
Q10		Answer any 4 from the following: 1. NORM in shale, 2. Extraction of heavy oil, 3. Environmental impact of shale gas development 4. Physical properties of hydrates, 5. Dual water system in shale 6. CBM in India	20

[Total No. of Questions: 8] **[Total No. Of Printed Pages: 4]**

UNIVERSITY OF PUNE
[4364]-692
B. E. (Petroleum Engineering) Examination - 2013
Improved Oil Recovery and Reservoir Simulation
(2008 Course)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

(1) Answers to the two ***sections*** *should be written in separate answer-books.*
(2) Question no 2(two) and 8(eight) are compulsory.
(3) Figures to the right indicate full marks.
(4) Answer 3 questions from Section-I and 3 questions from Section-II.
(5) Neat diagram must be drawn wherever necessary.
(6) Use of non-programmable calculator, log-log, and semi-log paper is allowed.
(7) Assume suitable data, if necessary.

SECTION-I

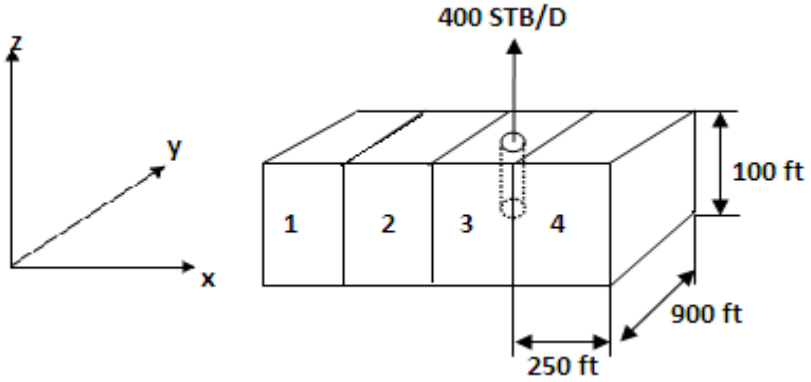
Q1	A	What do you mean by Reservoir Simulation? Explain in detail, its purpose, objectives and uses.	6
	B	What are the major steps involved in Reservoir Simulation? Explain in detail, with diagrams	10
Q2	A	Explain in detail 3 implicit and 3 explicit methods of discretizing an equation. Discretize the following equation given below, using 1 of the above defined explicit and 1 implicit scheme $$\frac{\partial u}{\partial t} - \alpha \frac{\partial^2 u}{\partial x^2} = 0$$	10
	B	Write the 1-D horizontal general fluid flow equation for oil, water and gas (both undersaturated as well as saturated)	8
Q3	A	Using a 1D reservoir block, and show six types of block ordering techniques used in reservoir simulation	6
	B	Using any of the finite difference schemes, solve the following differential equation. Consider a 3 element system with four nodes, u1 to u4, with both these being boundary nodes. Boundary conditions are provided for these nodes:	10

$\frac{\partial^2 u}{\partial x^2} - 2u = 0$ where $0 < x < 1$ and $f(x) = 4x^2 - 2x - 4$

Boundary Conditions are:

$u_1 = 0 \ @ \ x = 0 \ and \ u_4 = -1 \ @ \ x = 1$

Q4 A A well produces@ 400STB/D. Dimensions of the block are $-\Delta x$=250ft; w=900ft; h=100 ft; kx=270 md. Fvf=1.0 rb/stb; viscosity =2 cp. Write the flow equation for block 3, as shown in the figure below: 8



B What all information is needed for building a reservoir simulation model, and what are the steps involved in building a model? 8

SECTION-II

Q5 Describe Polymer EOR in detail with the screening criteria. Why does such a screening criteria exist. 16

Q6 Explain Thermal EOR, with the screening criteria. Why does such a screening criteria exist. 16

Q7 Explain waterflooding models with their assumptions. 16

Q8 Write short notes on (any three). 18

a) Microbial EOR
b) Well site layout for Surfactant Polymer EOR
c) Fractional flow theory
d) Buckley Leveret Model

Formulas/ Equations for the exam

$$\int_{t^n}^{t^{n+1}} \left\{T_{x_{i\,1/2}} \left[(p_{i1} - p_i) - \Upsilon_{i-1/2}(Z_{i-1} - Z_i)\right]\right\} dt + \int_{t^n}^{t^{n-1}} \left\{T_{x_{i+1/2}}\left[(p_{i+1} - p_i) - \Upsilon_{i+1/2}(Z_{i+1} - Z_i)\right]\right\} dt + \int_{t^n}^{t^{n+i}} q_{3C}\, dt = \frac{V_{b_i}}{a_c}\frac{d}{dp}\left(\frac{\phi}{B}\right)_i \left|p_i^{n+1} - p_i^n\right|,$$

$$\int_{t^n}^{t^{n+1}} w_x|_{x_i\,1/2}\,dt - \int_{t^n}^{t^{n+1}} w_x|_{x_i\,1/2}\,dt + \int_{t^n}^{t^{n-1}} q_{m_i}dt = m_{a_i}$$

$$T^m_{z_{i,j,k-1/2}}\left[\left(P^m_{i,j,k-1} - P^m_{i,j,k}\right) - Y^m_{i,j,k-1/2}\ \left(Z_{i,j,k-1} - Z_{i,j,k}\right)\right]$$
$$+T^m_{y_{i,j,-1/2k}}\left[\left(P^m_{i,j-1,k} - P^m_{i,j,k}\right) - Y^m_{i,j-1/2,k}\ \left(Z_{i,j-1,k} - Z_{i,j,k}\right)\right]$$
$$+T^m_{x_{i-1/2,j,k}}\left[\left(P^m_{i-1,j,k} - P^m_{i,j,k}\right) - Y^m_{i-1/2,j,k}\ \left(Z_{i-1,j,k} - Z_{i,j,k}\right)\right]$$
$$+T^m_{x_{i+1/2,j,k}}\left[\left(P^m_{i+1,j,k} - P^m_{i,j,k}\right) - Y^m_{i+1/2,j,k}\ \left(Z_{i+1,j,k} - Z_{i,j,k}\right)\right]$$
$$+T^m_{y_{i,j-1/2k}}\left[\left(P^m_{i,j+1,k} - P^m_{i,j,k}\right) - Y^m_{i,j+1/2,k}\ \left(Z_{i,j+1,k} - Z_{i,j,k}\right)\right]$$
$$+T^m_{z_{i,j,k+1/2}}\left[\left(P^m_{i,j,k+1} - P^m_{i,j,k}\right) - Y^m_{i,j,k+1/2}\ \left(Z_{i,j,k+1} - Z_{i,j,k}\right)\right]$$
$$+q^m_{sc_{i,j,k}} = \frac{V_{b_{i,j,k}}}{a_c\Delta t}\left[\left(\frac{\phi}{B}\right)^{n+1}_{i,j,k} - \left(\frac{\phi}{B}\right)^n_{i,j,k}\right],$$

$$T^m_{y_{i,j-1/2}}\left[\left(P^m_{i,j-1} - P^m_{i,j}\right) - Y^m_{i,j-1/2}\ \left(Z_{i,j-1} - Z_{i,j}\right)\right]$$
$$+T^m_{x_{i-1/2,j}}\left[\left(P^m_{i-1,j} - P^m_{i,j}\right) - Y^m_{i-1/2,j}\ \left(Z_{i-1,j} - Z_{i,j}\right)\right]$$
$$+T^m_{x_{i-1/2,j}}\left[\left(P^m_{i+1,j} - P^m_{i,j}\right) - Y^m_{i+1/2,j}\ \left(Z_{i+1,j} - Z_{i,j}\right)\right]$$
$$+T^m_{y_{i,j-\frac{1}{2}}}\left[\left(P^m_{i,j+1} - P^m_{i,j}\right) - Y^m_{i,j+\frac{1}{2}}\ \left(Z_{i,j+1} - Z_{i,j}\right)\right] q^m_{sc_{i,j}} = \frac{V_{b_{i,j}}}{a_c\Delta t}$$
$$\left[\left(\frac{\phi}{B}\right)^{n+1}_{i,j} - \left(\frac{\phi}{B}\right)^n_{i,j}\right]$$

$$\int_{tn}^{t^{n+1}}\left(\frac{u_x A_x}{B}\right)|_{x_i\,1/2}dt - \int_{t^n}^{t^{n-1}}\left(\frac{u_x A_x}{B}\right)|_{x_i\,1/2}dt + \int_{t^n}^{t^{n+1}} q_{sc_1}dt = \frac{V_{b_i}}{a_c}$$
$$\left[\left(\frac{\phi}{B}\right)^{n+1}_{i} - \left(\frac{\phi}{B}\right)^n_{i}\right]$$

$$+T^m_{x_{i-\frac{1}{2}}}\left[(P^m_{i-1} - P^m_i) - Y^m_{i-\frac{1}{2}}\ (Z_{i-1} - Z_i)\right] + T^m_{x_{i+\frac{1}{2}}}\left[(P^m_{i+1} - P^m_i)\right.$$
$$\left. - Y^m_{i+\frac{1}{2}}\ (Z_{i+1} - Z_i)\right]$$

$$+q^m_{sc_i} = \frac{V_{b_i}}{a_c\Delta t}\left[\left(\frac{\phi}{B}\right)^{n+1}_{i} - \left(\frac{\phi}{B}\right)^n_{i}\right]$$

$$T_{x_{i+\frac{1}{2}j,k}} = \left(\beta_c\frac{k_x A_x}{\mu B\Delta x}\right)|_{x_{i\,+\frac{1}{2}j,k}} = (\beta_c\frac{k_x A_x}{\Delta x})_{x_{i-1/2,j,k}}(\frac{1}{\mu B})_{x_{i+1/2,j,k}}$$
$$= G_{x_{i1/2,j,k}}(\frac{1}{\mu B})_{x_{i+1/2,j,k}}$$

$$T_{y_{i,j+1/2,k}} = \left(\beta_c \frac{k_y A_y}{\mu B \Delta y}\right)|_{y_{i,j+1/2,k}} = (\beta_c \frac{k_y A_y}{\Delta y})_{y_{i,j+1/2,k}} (\frac{1}{\mu B})_{y_{i,j+1/2,k}}$$

$$= G_{y_{i,j+1/2,k}} (\frac{1}{\mu B})_{y_{i,j+1/2,k}}$$

$$T_{z_{i,j,k\mp1/2}} = \left(\beta_c \frac{k_z A_z}{\mu B \Delta z}\right)|_{z_{i,j,k\mp1/2}} = (\beta_c \frac{k_z A_z}{\Delta z})_{z_{i,j,k\mp1/2}} (\frac{1}{\mu B})_{z_{i,j,k\mp1/2}}$$

$$= G_{z_{i,j,k\mp1/2}} (\frac{1}{\mu B})_{z_{i,j,k\mp1/2}}$$

[Total No. of Questions: 12] **[Total No. of Printed Pages: 4]**

UNIVERSITY OF PUNE
[4364]-693
B. E. (Petroleum) Examination - 2013
PETROLEUM PRODUCTION ENGINEERING - II
(2008 Course)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1. *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II*
2. *Answers to the two sections should be written in separate answer-books.*
3. *Neat diagrams must be drawn wherever necessary.*
4. *Black figures to the right indicate full marks.*
5. *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6. *Assume suitable data, if necessary.*

SECTION -I

Q.1 A Design a three phase horizontal separator using the following data Gas flow rate (Q_g)= 6 MMscf/day Oil flow rate (Q_o)= 6100 bbls/day Oil = 36^0API Sp. Gravity of water = 1.03 Operating Pressure = 1200 psia Operating Temperature = 80^0F Gas Compressibility = Z= 0.87 Specific Gravity of Gas = 0.6 Viscosity = 15 cp Use either, value of k= 0.284, constant used in gas capacity equation or Drag coefficient C_D = 0.846. Liquid drop to be separated = dm = 300 micron. Take 'coefficient' for a cylinder half filed with liquid = 0.250. Assume slenderness ration of 3 & 4. Retention time = 12 minutes. Draw the graph of liquid capacity constraint. **12**

B Explain in brief methods used to remove gas from oil (liquid). **6**

OR

Q.2	A	Categorize vertical separator, horizontal separator and spherical separators according to their usability in handling of solids, liquid surge capacity, efficiency in gas handling and pressure containment. Write your answer in a tabular form in terms of excellent/good/fair/poor.	9
	B	Name the equipment, draw any one schematic sketch and explain the process in brief, in which oil must be held at a temperature for a specific period of time to enable de-emulsifying the water in-oil emulsion.	9
Q. 3	A	Draw schematic of any three of the following process flow diagram separately as a part surface production facility, Group Gathering Station. Show various features, equipment and component in it. i) Stage separation ii) Gas compressor section iii) Free water knockout and bulk treater iv) Water treating system	16
		OR	
Q. 4	A	Write four important objectives of stage separation in a surface production facility.	4
	B	Investigate and Decide the sizing of a horizontal treater for a treating temperature of 120^0 F, 140^0 F, and 160^0 F. Value of tested oil viscosity is 11, 8 and 5 cp respectively at these temperature readings. Diameter of water droplet to be settled from oil at these temperature readings is 115, 145 and 180 microns respectively. Draw necessary graph. Other data: Oil gravity 34^0API. Oil flow rate 5500bbl/day. Inlet oil temperature 88^0 F. Water sp. Gravity 1.03. Retention time 20 minutes	12
Q. 5	A	Describe the chemistry of corrosion process in brief.	8
	B	Explain the method of cathodic protection to prevent corrosion in brief.	8
		OR	
Q. 6	A	Write short notes on. i) Carbon dioxide or sweet corrosion ii) Hydrogen sulfide or sour corrosion iii) Important factors or potential sources that contribute to corrosion iv) Chemical inhibition to reduce corrosion	16

SECTION II

Q. 7	A	State true or false with correct reasoning in brief i) High GOR magnifies paraffin deposition problem ii) Paraffin build up in the tubing will never lead to over load of rod pumps iii) Temperature reduction is the most common cause of wax deposition iv) Increase in WOR increases chances of wax deposition	8
	B	Discuss in brief the role of solvents and dispersants in removing paraffin from the wells	10
		OR	
Q. 8	A	Write at least eight primary factors responsible for scale precipitation, deposition and crystal growth as a direct cause of scaling	8
	B	What is critical gas production rate? Explain the general approach to maintain well productivity in brief.	6
	C	Discuss in brief inhibition of scale deposition using any one technique	4
Q. 9	A	Draw typical DST curves to indicate following features i) Low permeability formation with a low pressure reservoir ii) Low permeability formation with a high pressure reservoir iii) Low productivity formation with a low pressure reservoir	9
	B	Draw a neat schematic of Cumulative weight % Vs grain diameter and explain only explain only graphically application of any one standard correlation to fix the size of gravel for sand control job. Indicate necessary parameters on it.	7
		OR	
Q. 10	A	What is critical rate of oil production? If it is not economical to produce the well at critical production rate,	4

suggest the remedy.

B It was desired to improve the overall production performance of a typical field having 40 wells, producing from two different pay zones. Following information is available in a generalized form. Explain, how will you recognize these kinds of typical production problems of a field? Write in brief your solution to tackle with each one of the following field condition. 12

i) Onshore location, having vertical and deviated wells, conventional completion for low API gravity oil production.
ii) Anticline structure having combination of gas cap and water drive mechanism.
iii) Unconsolidated thick sand with presence of thin impermeable shale layers
iv) GOC and OWC shifted
v) Medium depth low pressure formation
vi) Low permeability carbonate formation with +2 skin factor for few wells
vii) Reservoir pressure is less than bubble point and gas production does not cause loss of oil recovery
viii) High water cut along with sand production.
ix) Target of primary recovery component achieved
x) Scale and wax deposition seen at bottom hole, shallow depth and in the surface pipe line
xi) Partially plugged perforations

Q. 11 A Write short notes on, 16

i) Intelligent well completion
ii) Production advantages of horizontal well technology
iii) Multilateral well completion
iv) Different techniques of heavy oil production

OR

Q. 12 A Draw neat schematic sketches and discuss in brief working and benefits of, 16

i) Subsea separation and processing technology.
ii) Downhole separation and injection of production fluids.

[Total No. of Questions: 12] **[Total No. of Printed Pages: 4]**

UNIVERSITY OF PUNE

[4364]-695

B. E. (Petroleum Engineering) Examination - 2013

DEEP WATER TECHNOLOGY (2008 Course)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1 *Answer any three questions from Section I and any three questions from Section II*

2 *Answers to the two sections should be written in separate answer-books.*

3 *Neat diagrams must be drawn wherever necessary.*

4 *Black figures to the right indicate full marks.*

5 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6 *Assume suitable data, if necessary.*

SECTION -I

Q.1 A Discuss structural design of jack up rig, forces acting on legs (Truss), tubular joint classification with suitable figures. 16

OR

Q.2 A Write short notes 16

i) ROV
ii) Principle motions on a floating drilling vessel.
iii) Metacenter
iv) Geotechnical aspect of sea floor marine soil.

Q. 3	A	Discuss drilling and lowering procedure of structural casing in detail.	8
	B	Using following data calculate the number of bottles required at surface and subsea if the stack mounted bottles are to be designed to close one annular and 1 Ram, surface bottles are required to close and open the remaining functions There are 2 Rams, 1 shear ram and 1 annular preventer. Gallons to close one annular = 17.98 Gallons to open one annular = 14.6 Gallons to close one ram = 5.8 Gallons to open one ram = 10.8 Gallons to close one shear ram = 10.9 Gallons to open one shear ram =10.5 Water depth = 3000ft Sea water gradient = 0.445 psi/ft Capacity of accumulator bottle = 10 gallons	10
		OR	
Q. 4	A	Discuss DP system of station keeping in detail	8
	B	Discuss design factors of riser system and describe different components of riser system in detail.	10
Q. 5	A	Show that poisson's ratio between 0 to 0.5	6
	B	Plot a tensor for general 3D state of stress in a reservoir.	5
	C	Draw subsea well head BOP stack.	5
		OR	
Q. 6	A	Discuss different rock deformation types.	6

	B	Tensor	10

$$A = \begin{bmatrix} -2 & -8 & -12 \\ 1 & 4 & 4 \\ 0 & 0 & 1 \end{bmatrix}$$

Find out 3 stresses and its direction

SECTION II

Q. 7	A	Discuss production platform design and planning on the basis of input data, foundation pile size and loads on pile.	18

OR

Q. 8	A	Draw typical platform layout and process flow diagram.	18
Q. 9	A	Discuss Duel bore and mono bore concentric vertical subsea tree in detail with suitable sketch	8
	B	Discuss design consideration and operations of oil & gas separators in brief.	8

OR

Q. 10	A	Discuss different component of DST string and their functions in detail. Calculate water volume to create drawdown of 1000 Psi using water of 8.33 PPg to activate the well Well depth = 2464.5 m (MD) Perforation depth = 2404.5 m (TVD) Reservation pressure = 4500 Psi Mud weight = 12 PPg DST string contains 2-7/8" tubing ID = 2.441 inch	16

Top of string contains 5" D/P, *İ*D= 4.27 inch

Q. 11	A	Discuss subsea oil and gas pipeline–design construction in detail.	10
	B	Discuss pressure drop calculations for two phase flow including riser behavior.	6

OR

Q. 12	A	Write short notes	16

i) Reservoir management
ii) Any one EOR technique
iii) Offshore storage
iv) Gravity platform

[Total No. of Questions:12] **[Total No. of Printed Pages: 3]**

UNIVERSITY OF PUNE
[4364]-696
B.E. (Petroleum Engineering)
Examination-2013
Transport of Oil and Gas
Elective-III (2008 Course)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions

1) Answer Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6 from section-I and Q.No.7 or 8**,** Q.No.9 or 10,Q.No.11 or 12 from section-II.

2) Answers to the two sections must be written in separate answer book
3) Figures to the right indicates full marks.
4) Neat diagram should be drawn wherever necessary
5) Use a non programmable calculator
6) Assume suitable data if necessary and clearly state it

SECTION–I

Q1. a) Explain with neat sketches horizontal and vertical flow maps? [8]

b) Write short note on [8]
1. Distribution line network
2. Floating roof storage tanks

OR

Q2. Write short note on [16]
1) Group gathering station
2) Importance of flow improvers in long distance pipelines
3) Subsea oil and gas transportation
4) FPSO

Q3. 1. Explain the criteria for selecting wall thickness and line size? [6]

2. Find pressure drop in a 2 inch and 4 inch I.D. line using the general equation and Hazen-Williams equation. Data given: Flow rate of condensate and water is 800 and 230 bpd. Specific gravity of condensate and water is 0.87 and 1.05, Viscosity=3 cp, Length=7,000 ft, inlet pressure=900 psi, temperature=80 F.ε=0.004, C=120, f=0.032 and 0.034 for 2” and 4” respectively. [10]

OR

Q 4.	1.	Gas flows to dehydrator, which operates at 800 psi. Line is rated for 1480 psi. **Choose a line size and wall thickness using B 31.3 and B 31.8.** **Data given:** Z=0.67 Vmax=60ft/s, Vmin=10-15 ft/s Pressure drop=900-800=100 psi. Gas Flow rate=23 MMscfd, Viscosity=3cp, Gas Gravity=0.85, Length=7000 ft, E=0.95 ρ'm= 6.93 lb/cu ft. For 8" F=0.72, E=1, T=1, S=35,000. For 6" F=0.6, E=1, T=1, S=25,000. For 4" F=0.4, E=1, T=1, S=20,000	[10]
	2.	Explain in detail about pipeline pressure rating classes and API 6A?	[6]
Q5.	**a)**	Write short note on Valve sizing?	[4]
	b)	Explain with a neat sketch working mechanism of gate and globe valve?	[7]
	c)	Write in brief about importance of head loss in valves and fittings in oil and gas pipeline design?	[7]
		OR	
Q6.	**a)**	Explain in detail about utility Pigs and their types?	[5]
	b)	Write about in-line inspection tools	[4]
	c)	Write short notes on gel pigs.	[4]
	d)	Explain in detail about monitoring and troubleshooting of oil and gas pipelines?	[5]
		SECTION II	
Q7.	1.	Write about classification of pumps used for oil and gas transport?	[4]
	2.	Explain construction, design and working of centrifugal pump with a neat sketch?	[6]
	3.	Explain importance of NPSH and write formula for finding NPSH?	[5]
	4.	Write a short note on dynamic compressors?	[3]
		OR	
Q8.	1.	Write notes on diaphragm pumps with neat sketch?	[5]
	2.	Write notes on rotary pumps?	[3]
	3.	Explain the basic selection criteria for pumps?	[3]
	4.	Find the horsepower required with and without intercooling when compressing 16,000cfm of natural gas, k=1.28, measured at 60 F and 14.7 psia from atmospheric pressure of 14.4 to 125 psig. Inlet temperature is 70 F. Allow a 4% discharge at each stage.	[7]
Q 9.	1.	Draw and explain in brief gas to methanol process?	[6]
	2.	Explain in detail transportation and processing of liquefied natural gas?	[5]
	3.	Explain in detail about gas monetization focusing on gas to power, to solid and gas to liquid?	[5]
		OR	

Q 10. Short notes on: [16]

1. Stranded gas
2. Deep offshore gas reserves
3. Associated gas reserves
4. Fischer-Tropsch Route

Q11. A. What are the effects of hydrate formation in subsea system and methods for preventing hydrate formation? [8]

B. Explain economics for long distance subsea pipelines? [8]

OR

Q12. A. What are different methods of flow assurance? Explain any two in brief? [8]

B. Write in detail about oil and gas pipeline maintenance and repair? [8]

[Total No. of Questions: 12] **[Total No. of Printed Pages: 3]**

UNIVERSITY OF PUNE
[4364]-697
B. E. (Petroleum engineering) Examination - 2013
Environmental Technology and Safety in Petroleum Industry
(2008 Course)(Elective -3)

[Time: *3* Hours] **[Max. Marks: 100]**

Instructions:

1. ***Answer*** *three questions from section I and three questions from section II.*
2. *Q No. 5& Q No. 10 are Compulsory.*
3. *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*
4. *Neat diagrams must be drawn wherever necessary.*
5. *Assume suitable data, if necessary.*
6. *Use of non programmable electronics pocket calculator is allowed*
7. *Black figures to the right indicate full marks.*

SECTION -I

Q.1	A	Discuss the classification of pollutions by petroleum industry? Explain any one in detail.	[6]
	B	Explain in detail environmental impact of gas flaring? What measures are to be taken to reduce its environmental impact?	[6]
	C	What are the types of solids contained in waste water? Give detailed classification.	[4]

OR

Q.2	A	What is HAZOP analysis? Explain advantages and disadvantages of HAZOP analysis with an example?	[6]
	B	Discuss hazardous materials used in petroleum industry and their potential impact on the environment?	[6]
	C	Discuss the characteristics of produced waters in Petroleum industry? How are these harmful to environment?	[4]
Q.3	A	What are Indian and international standards for discharge of produced water with reference to petroleum industry?	[6]
	B	Write note on Accidental discharges of petroleum fields into environment with an example?	[4]
	C	Write in detail on potential impacts of production discharge on the	[6]

		environment in the onshore and offshore areas?	
		OR	
Q. 4	A	Discuss any four important parameters used internationally to assess quality of produced wastewater.	[4]
	B	Write in detail on potential impacts of drilling discharge on the environment in the onshore and offshore areas?	[6]
	C	Write short notes on impact of crude oil on marine animals, ecosystems, human health, on plant growth?	[6]
Q. 5	A	Write short notes on neutralization of petroleum industry waste?	[6]
	B	Explain the process of size assessment for remediation of contaminated site?	[6]
	C	Write notes on subsurface disposal of petroleum industry waste- Disposal of liquids, Disposal of solids.	[6]
		SECTION II	
Q. 6	A	Write short note on OHSAS 18001 and ISO 14000?	[4]
	B	What are Safety audits? What are benefits of Safety audits?	[6]
	C	What are the procedures for onshore/ offshore well abandonment?	[6]
		OR	
Q. 7	A	Write short notes on a) Work Permit system b) Root cause analysis c) Job safety analysis	[6]
	B	Explain the significant issues involved decommissioning of oil & gas field?	[6]
	C	Explain in details the guidelines of plugging abandoned oil well?	[4]
Q. 8	A	What are environmental aspects of oil field operations with respect to a) Seismic b) drilling c) offshore	[6]
	B	What are the different types of primary & Secondary treatment available for wastewater treatment? Write in details about any two treatments.	[6]
	C	What are effects of emulsification on the oil spills?	[6]
		OR	
Q. 9	A	What are reactive/ proactive system models of HSE management?	[6]
	B	Discuss ERP and regulatory requirement for ERP?	[6]
	C	What are effects of oil spills on aquatic life?	[6]
Q. 10	A	Discuss occupational health hazards and risks in petroleum industry	[6]
	B	Discuss safety systems and risk management in offshore installations?	[6]
	C	Discuss factors affecting oil spill movements.	[4]

[Total No. of Questions: 08] **[Total No. of Printed Pages: 4]**

UNIVERSITY OF PUNE
[4364]-698/241
B. E. (PETROLEM ENGINEERNG) Examination - 2013
PETROLEUM ECONOMICS
(2003 and 2008 Course)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1 *Answers to the two sections should be written in separate answer-books.*
2 *Black figures to the right indicate full marks.*
3 *Use of semi log graph paper is allowed*
4 *Assume suitable data, if necessary.*
5 *Answer any three questions from Section I and any three questions from Section II*

SECTION I

Q.1 A) Following are the details of oil production form a well. Plot the information on suitable graph extrapolate time required to decline to economic limit of 500 BOPD [15]

Month	BOPD	Month	BOPD
1	540	13	2160
2	5000	14	2050
3	4800	15	1910
4	4100	16	1790
5	3900	17	1700
6	3600	18	1620
7	3300	19	1550
8	3100	20	1500
9	2900	21	1410
10	2650	22	1370
11	2400	23	1300
12	2350	24	1280

Describe the pattern of declining in production. What is the OOIP, if original recovery of oil was 22% If production reaches to 500 BOPD then what is the total production of oil with recovery percent?

B) Write a detailed note on guidelines given by SPE and UN for the evaluation of petroleum reserves and resources [10]

OR

Q.2 A) An oil field is estimated to have total reserves amounting to be 800,000 bbl. The performance prediction trend has shown a graph of an initial rate of 400 BOPD to an economic limit of 30 BOPD. Calculate the total [15]

time on production assuming. successively the following values of parameter b: (a) b= 0 (b) b= 0.5 and (c) b = 1.0

B) Write in brief about following [10]

1) Reserves Auditing
2) Oil differential

Q. 3 A) The company management has opportunity of investing $50 million in an oil field with low risk, which has economically producing capacity of 12 years. The project would require an investment of $ 5 million at year 5 and again at year 10 of $ 5 million. Annual maintenance cost would be $ 1 million throughout the tenure of the project. The interest rate for the first eight years is 10%, and for the last four years will be 12%. [15]

What is the present worth of this cash flow? Draw a cash flow diagram for the above data

B) Write notes on any two of the following [10]

a) Investment Yardsticks,
b) Sensitivity Analysis,
c) Reserves to Production ratio (R/P)
d) Key international benchmark grade of oil

OR

Q. 4 A) The project under consideration requires an investment of $ 120,000 which will result in the cash flow generation for next five year as $ 40,000, $ 50,000, $ 30,000. $ 30,000 and $ 20,000 respectively. Calculate the NPV at 10% and also the DCFROR for the project. [15]

B) Write a note on Production and Demand of hydrocarbons in India [10]

SECTION II

Q. 5 A) Write notes on any two of the following : [10]

1) Profitability in projects and equivalence of field size in different countries within the framework of Production Fiscal System
2) Expected Monetary Value , EMV
3) Depreciation and depletion
4) Production sharing contract

B) A drilling company is considering bidding on a $ 150 million turnkey drilling contract for offshore oil wells. The company estimate that it has a 65% chance of winning the contract. It has three alternatives available [15]

1) use the existing rig to drill the wells
2) by a new rig
3) subcontract the drilling to another drilling company

Subcontracting is allowed in the fiscal documents. Probabilities and payoffs of each operations is given in following table

	Probability	NPV (million dollars)
Using existing facility		
High profit	0.35	60

Medium profit	0.45	30
Low profit	0.20	-20
Buying new rig		
High profit	0.55	35
Medium profit	0.35	25
Low profit	0.10	-10
Subcontract		
Medium profit	1.0	30

The cost of preparing the contract proposal is $ 1 million. If the company does not bid on this tender, it has an opportunity to make a guaranteed profit $ 10 million elsewhere.
Construct a decision tree for this situation and advice the contractor about decision with proper justification and all calculations.

OR

Q. 6 A) An asset was purchased for $ 96,000 with an estimated service life of 10 year and has a salvage value of $ 12,000. Calculate its depreciation using straight line (SLD) and double declining (DDB) method. Prepare a plot of value against number of years and compare the result obtained by different results. [15]

B) A company is planning to drill a well. The company professionals estimate that there is a 65% chance that the well will be a producer and 35% change that it will be a dry well. If the well is successful, it is estimated that there is 60% chance that the well will have reserves of 30,000 barrels, 30% chance of 60,000 barrels and 10% chance of 90,000 barrels and NPV corresponding to each reserves value will be $ 60,000 $120,000 and $ 150,000 respectively. The dry well cost is $ 65,000. Draw a decision tree and give decision with proper justification. Preserve all calculations. [10]

Q. 7 A) Construct a critical path study to develop a medium size field for which details are given below: [15]

1) Sixty development wells ($1.5 MM each)- one third will be injectors.
2) Three platforms – two for wells, the other for production/injection equipment and pipeline terminus. ($ 310 MM each).
3) Well take about one month to drill. Up to two rig / platform
4) Platforms manufactured in one and a half years- two out time one month during weather window in summer (Two out costs $ 10 MM0). Setup time is three months for drilling/ well platform.
5) Pipeline lay time is about 14 months. (Cost $ 180MM)
6) Production “commissioning” and final permit take two months. ($ 5 MM)
7) Overhead and other ongoing costs = $1 MM/ month

The main idea of this exercise id to avoid waste of time, labor

and material

1) Draw a critical path diagram for this project. Assume a starting date of July, 1, 2013
2) Determine the time length of the critical path.
3) Plot cumulative costs as a function of time.

B) Write a detailed note on Petroleum Accounting system [10]

OR

Q. 8 A) Use following production data for calculation. [25]

Year	BOPD	Year	BOPD
1	1050	9	1351
2	1170	10	1183
3	1305	11	1037
4	1455	12	908
5	1761	13	795
6	1761	14	697
7	1761	15	610

Following are the assumption for the preparation of spreadsheet and further calculations:

1) Exploration and Development cost is $ 150 million barrels which has to be spent equally in five years
2) Annual operating and production cost will be $ 3.50 / barrel, which will remain constant throughout production
3) Production will begin in the sixth year since award of contract
4) Oil price will be $ 75 per barrel and will remain constant
5) Royalty will be 10% of annual revenue / annual production.
6) Cost recovery will be 70% from fist year of commercial production and profit petroleum will 30%
7) Profit petroleum will be shared between the contractor and government.
8) Contractor share will be 60% and government will take 40% oil
9) Time value of money is 10%
10) Income tax for contract will be 30% on taxable income
11) Calculate the contractor NPV before tax and after tax.

Show how one barrel of oil or $ 75 will be distributed using the assumptions given above?

[Total No. of Questions: 10] **[Total No. of Printed Pages: 3]**

UNIVERSITY OF PUNE
[4364]-699
B.E. (Petroleum Engineering) Examination - 2013
Petroleum Production Enhancement and Optimization:
(2008 Pattern)(412390B)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1. ***Answer*** *three questions from section I and three questions from section II.*
2. *Q2(two) in Section I is compulsory.*
3. *Either of Q 5 (five) or Q6 (six) in Section II are compulsory.*
4. *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*
5. *Neat diagrams must be drawn wherever necessary.*
6. *Assume suitable data, if necessary.*
7. *Use of a non-programmable calculator, log-log and semi log paper is allowed.*
8. *Black figures to the right indicate full marks.*

SECTION -I

Q.1	A	On what basis can one classify stimulation candidates as good or bad?	[6]
	B	Explain with equations and appropriate diagrams, the concept of Young's Modulus and Poisson's Ratio. Also explain the effect of Young's Modulus on the hydraulic fracture	[10]
Q.2	A	Estimate the surface pressure and horse power requirements considering the following scenario: a) FG=0.8 psi/ft b) MD Perforations =Top: 9,780 ft; Bottom: 9,810ft c) 31/2" tubing 6.5lb/ft d) YF130 with SG=1 e) Rate =40bpm f) Frictional pressure gradient =400psi/1000ft g) Number of Perforations =4perfs / ft; Diameter of Perforations =0.4" h) Perforation friction = 12.7 psi i) P_{NET} =240 psi	[10]
	B	Explain with a diagram how the ISIP is computed during a Data Frac operation	[8]
Q.3	A	With the help of a diagram, explain the various pressure terms used in DataFrac and calibration test	[10]
	B	Write short notes on: -Near wellbore pressure losses -Step Rate Test	[6]

Q. 4	A	Calculate the fracture gradient under the following conditions: a) Casing 7",#29to 3,500ft b) M.D. top perf 3,250 ft c) M.D. bottom perf 3,348 ft d) Fluid being pumped –OIL API gravity 35° e) ISIP =1,400 psi	[10]
	B	What are the types of fracture models, and how are they different from each other? Explain with appropriate diagrams.	[6]

SECTION II

Q. 5		What do you mean by optimization? In general why it is necessary to go for optimization in Petroleum Production related processes or equipments? List, at least six general situations in which you may need to go for production optimization.	[18]

OR

Q. 6	A	Draw the generic nature of following graphs and explain their role in optimization in brief a) Choke performance curves b) Production rate Vs Tubing diameter c) Pressure drop in tubing Vs Production rate at optimum GLR and for various GLR values	[12]
	B	How choke differ from other completion equipment such a SSV or SSSV? List the reasons for which it is often necessary to control the flow through chokes	[6]

SECTION II

Q. 7		Draw the sequence of flow regimes that takes place before liquid loading of a gas well. Draw schematic sketches and explain and explain in brief any three techniques to unload the liquid from a gas well	[16]

OR

Q. 8	A	Write the various techniques or tools that are available to improve the production performance of a field. Explain any one of them along with application	[8]
	B	What is real time monitoring? Write the benefits of real time monitoring of surface and subsurface production system in oil and gas field. How it is useful in the diagnosis of system performance? Explain in brief	[8]
Q. 9		Discuss in brief, how long term planning and optimization techniques of well completion or well design for a high pressure, high permeability reservoir will help you to minimize following problems along with better production management and minimum water and gas coning. a) Well stimulation b) Re-perforation with reference to OWC and GOC	[16]

c) Water and gas shut off jobs

OR

Q. 10 Discuss any one case study, in detail to explain the application and scope of production optimization that was applied either for a well bore or a field to improve the productivity [16]

a) Write the objective or problem statement of the case study

b) Describe the challenges involved, data available, techniques and step by step approach that was taken to utilize the available resources and improve the overall efficiency of the production facility under consideration.

c) Indicate the findings of results of discussion using graph and explain them with mathematical equations if any

[Total No. of Questions: 12] **[Total No. of Printed Pages: 4]**

UNIVERSITY OF PUNE
[4364]-700
B. E. (Petroleum) Examination - 2013
WELL CONTROL METHODS(2008 Course)
[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1. *Answer **any three** questions from **Section I** and **any three** questions from **Section II***
2. *Answers to the two sections should be written in separate answer-books.*
3. *Black figures to the right indicate full marks.*
4. *Neat diagrams must be drawn wherever necessary.*
5. *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6. *Assume suitable data, if necessary.*

SECTION -I

Q.1	A	Discuss swab and surge effect on bottom hole pressure in detail	5
	B	A pump pressure of 1000 psi was recorded at pump speed 40 SPM what is the new pump pressure at 30 SPM.	3
	C	Discuss primary secondary and tertiary well control in brief.	6
	D	Calculate ECD when hydrastatic head at static = 5200 Psi, and while circulation = 5320 Psi well depth = 10,000ft.	2
		OR	
Q.2	A	Discuss U tube concept in detail and calculate influx height and gradient. SIDP = 500 Psi SICP = 610 Psi Kick vol = 10 bbl Hole size = 8 -1/2" OHX drill pipe = 0.0459 bbl/ft OHX drill collar = 0.03 bbl/ft TVD = 10,000 Mud weight = 10 PPg Drill collar length = 600 ft	8
	B	What is leak-off test? Discuss test procedure	8
Q. 3	A	Draw choke Manifold and discuss soft shut off/ hard shut off.	10
	B	Well depth = 10000 ft, Mud weight = 10 PPg formation pressure at 10,000 ft is 5000 Psi what shall be the effect on BHP after pulling 5" drill pipe (10 stands of 90 ft.) dry without filling the hole. Metal displacement 5" D/P = 0.0080 bbl/ft 9-5/8" casing shoe = 1000 ft	6

D/P capacity = 0.0177 bbl/ft
Casing capacity = 0.0717 bbl/ft
Annular vol. 5" x 9-5/8" casing – 0.0475 bbl/ft

OR

Q. 4 A Describe following terminology with respect to kick while drilling 10
i) Rate penetration trends
ii) Drilling break
iii) Shale density
iv) Connection gas
v) Back-ground gas.

B Discuss gas influx behavior in open well and closed well migration 6

Q. 5 A Draw accumulator (hydraulic system) system of BOP and explain the functions of 12
i) Hydroelectric pressure switch
ii) Four way valve

B Write short notes on 6
i) FOSV
ii) IBOP

OR

Q. 6 A In a 3000 Psi BOP control unit hoe many 10 gallons capacity accumulator bottles with 1000 PSI pre charge pressure are required when 96.6 gallons of operating fluids is needed including safety factor for all functions of BOP of 10000 with closing ratio 7:1 6

B Write short notes on 6
i) Bit float
ii) Test plug
iii) Cup tester.

C Discuss difference between surface and subsea BOP stack. 6

SECTION II

Q. 7 A Discuss drillers method of well killing in detail 9

B Discuss well control aspect in multilateral wells 9

OR

Q. 8 A Prepare kill sheet for following well data. Hole size 8-$1/2$" inch. Hole depth = 11962 ft/10892 ft casing 13-$5/8$" se at 9537 ft/9472 ft Drill pipe 5" inch, capacity 0.0176 bbl/ft HWDP 5 inch, 484 ft, capacity 0.0088 bbl/ft Drill collars 6-$1/4$" inch, 720 feet, capacity 0.007 bbl/ft Mud density 14.5 PPg 18
Capacity

Drill collar in open hole = 0.032 bbl/ft
Drill pipe/HWDP = 0.0447 bbl/ft (open hole)
Drill pipe/HWDP in casing = 0.0493 bbl/ft
Mud pimps displacement = 0.109 bbl/Stles
Slow circulating rate = 720 Psi at 30 SPM
Fracture mud weight at casing shoe= 16.9 PPg
Kick data:
STDP = 520 Psi SICP = 783 Psi
Pit gain = 1266 bbl
Surface line volume from mud pump to RKB = 6bbl
Calculate"

i) What is pressure safety margin at casing shoe with the well shut in?
ii) Strokes required from mud pump to bit?
iii) Strokes required bit to casing shoe
iv) Time for complete circulation
v) Kill mud density
vi) ICP
vii) FCP
viii) MAASP after circulation of kill mud
ix) Pressure drop per 100 Stles

Q. 9 A Write short notes on: 16

i) Choke line friction pressure loss
ii) Hydrate formation and prevention
iii) Diverter system.

OR

Q. 10 A Discuss features, benefits and construction of a rotating Blowout preventer. 8

B Draw mud-gas separator and discuss working principle in brief. 8

Q. 11 A Discuss following unusual situations in well control 8

i) Partial plugging
ii) Total plugging
iii) Wash out bit Nozzles
iv) Plugged choke

B Discuss well control during loss circulation 8

OR

Q. 12 A Data given: 16

Well depth = 14080 ft, Surface pr = 1420 Psi
Mud weight = 11.7 PPg, fracture gradient = 0.702Psi/ft,
Intermediate casing shoe = 12097 ft
Gas gravity = 0.6

Bottom hole pressure P_b = 8442 Psi
temperature = 540^0 Rankine, Z = 0.82
kill mud weight = 12.8 PPg
Capacity drilling x annulus = 0.0264 bbl/ft
DST at 13913 ft
plugged drill pipe at 12513 ft
Calculate by volumetric kill lubrication:
i) height of gas bubble and volume of gas bubble
ii) margin for pressure increases at casing shoe
iii)pump 20 bbl kill mud, allow gas to migrate to surface , reduce surface pressure by bleeding gas z = 0.866.
Find out pressure to bleed, after bleeding calculate hydrostatic at 13913 ft to ensure no additional influx, check effective margin at shoe.