**Code No: 56097** **R09**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech III Year II Semester Examinations, April - 2018**
**RESERVOIR ENGINEERING**
**(Petroleum Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any five questions**
**All questions carry equal marks**
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1. The following data are related to an oil reservoir:

| | |
|---|---|
| Reservoir area | = 530 acres |
| Average thickness | = 20 ft |
| Connate water saturation | = 0.20 |
| Effective porosity | = 17% |
| Initial Formation volume factor for Oil | = 1.3942 res. Bbl/STB |
| Total oil produced | = 2,300,000 STB |

a) Define and Calculate Oil Initially In Place.
b) Define and Calculate the STOIP.
c) Define and Calculate the Recovery factor. [5+5+5]

2. Answer the following for the PVT analysis of oil.
a) Explain the 2 methods for the collection of reservoir fluid samples
b) Explain flash expansion test, differential expansion test and separator test. [5+10]

3. Derive the material balance equation for an oil reservoir (Gas cap reservoir) and define all the parameters in the equation. [15]

4.a) Derive the basic differential equation for radial flow in porous media (Derive Radial diffusivity equation).
b) Describe the conditions of solution for radial diffusivity equation. [8+7]

5. Explain how the following tests are done and its test data analysis
a) Single Rate Drawdown test
b) Pressure Buildup test
c) Multi-rate Drawdown test. [5+5+5]

6. A well and reservoir are described by the following data:

| | |
|---|---|
| Porosity | 19 % |
| Formation volume factor for oil | 1.4 $rm^3/stm^3$ |
| Net thickness of formation | 100 m |
| Viscosity of reservoir oil | $1.4\times10^{-3}$ Pas |
| Wellbore radius | 0.15 m |
| External radius | 900 m |
| Initial reservoir pressure | 400 bar |

Determine the following:
a) The wellbore flowing pressure after 4 hours production
b) The pressure in the reservoir at a radius of 9m after 4 hours production. [8+7]

7. Explain the following solution techniques of radial diffusivity equation for gas reservoirs.
   a) The Russell, Goodrich et. Al solution technique
   b) The Al-Hussainy, Ramey and Crawford technique [7+8]

8. Write a short note on the following:
   a) The unsteady state water influx theory of Hurst and Van Everdingen
   b) Approximate water influx theory of Fetkovitch [7+8]

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