

Code No: 56097

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year II Semester Examinations, December - 2017****RESERVOIR ENGINEERING****(Petroleum Engineering)****Time: 3 hours****Max. Marks: 75****Answer any five questions****All questions carry equal marks**

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- 1.a) What is the major role of reservoir engineer in oil and gas field operations?  
b) Calculate OIP (oil in place) and STOIP (stock tank oil initially in place) for following data:  
 $V = 95$ ,  $\phi = 22.5\%$ ,  $S_{wc} = 21.5\%$ ,  $B_{oi} = 1.52$  rbl/stb  
c) With a neat schematic diagram discuss various fluid pressure regimes. [5+5+5]
- 2.a) Mention various factors responsible for abnormal fluid pressure in enclosed water bearing sands.  
b) With an example illustrate the uncertainty in estimating the possible extent of an oil column, resulting from well testing in the gas cap. [5+10]
- 3.a) Write the expression for ultimate recovery (UR) and explain its significance.  
b) The following data are available for a newly discovered gas reservoir:  
GWC = 9700 ft, Centroid depth = 9537 ft, Net bulk volume (V) =  $2.7 \times 10^{10}$  cu.ft  
 $\phi = 25.0\%$ ,  $S_{wc} = 0.20$ ,  $\gamma_g = 0.85$ ,  $Z_{GWC} = 0.888$ . The water pressure regime in the locality is given by following expression:  $P_w = 0.441D + 31$  psia. Temperature gradient is  $1.3^\circ\text{F}/100$  ft, with ambient surface temperature  $80^\circ\text{F}$ . Calculate the volume of the GIIP. [5+10]
4. Define following terms:  
a) Solution (or dissolved) gas oil ratio ( $R_s$ )  
b) Oil formation volume factor ( $B_o$ )  
c) Gas formation volume factor ( $B_g$ ). [5+5+5]
- 5.a) Write general expression of material balance for a hydrocarbon reservoir. Also, explain the significance of each term of the equation.  
b) Discuss solution gas drive mechanism. [10+5]
- 6.a) Derive Darcy's law for linear flow.  
b) Discuss the importance of water drive mechanism in recovery of the hydrocarbons during production. [10+5]
- 7.a) Determine the fractional oil recovery, during depletion down to bubble point pressure, for the reservoir whose PVT parameters are listed below:  
 $C_w = 3.0 \times 10^{-6}$  / psi,  $S_{wc} = .20$ ,  $C_f = 8.6 \times 10^{-6}$  / psi  
 $P_i = 4000$  psi,  $B_{oi} = 1.2417$  rb/stb,  
b) Define significance of formation oil volume factor in reservoir engineering. [10+5]

- 8.a) Write basic equation for the radial flow of a fluid in a homogeneous porous medium.  
 b) Solve radial diffusivity equation for semi-steady state flow conditions having pressure distribution and geometry as shown below: [5+10]

