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**PETROLEUM ENGINEERING EXAMINATIONS  
SYLLABUS**

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**GROUP A  
COMPULSORY EXAMINATIONS (7 REQUIRED)**

**98-Pet-A1 Principles of Stratigraphy and Sedimentation**

Sedimentary processes, environments and facies; properties and classification of sedimentary rocks; code of stratigraphic nomenclature and the stratigraphic column; stratigraphic nomenclature and the stratigraphic column; stratigraphic relationship and interpretations.

*Recommended Texts:*

*Prime Text:*

Boggs, S., Principles of Sedimentology and Stratigraphy, 2<sup>nd</sup> edition. Merrill Publishing Co., Toronto, 1995. ISBN 0023117923.

*Supplementary Texts:*

Krumbein, W.C. and Sloss, L.L., Stratigraphy and Sedimentation, 2<sup>nd</sup> edition. W.H. Freeman and Co., 1963. ISBN 0716702193.

Walker, R.G. (Editor), Facies Models, 3<sup>rd</sup> edition. Geoscience Canada Reprint Series 1, Geological Association of Canada, 1992. ISBN 0919216498.

Prothero, D.R., Interpreting the Stratigraphic Record. W.H. Freeman & Co., 1990. ISBN 0716718545.

**98-Pet-A2 Petroleum Reservoir Fluids**

Phase behaviour of hydrocarbon systems ideal and non-ideal gases and liquid systems; qualitative and quantitative phase behaviour; fundamental properties of gas, oils, and waters; application of basic fluid properties to compositional analyses; separation and reservoir behaviour.

*Recommended Texts:*

*Prime Texts:*

Amyx, J.W. Bass, D.M. and Whiting, R.L., Petroleum Reservoir Engineering. McGraw-Hill, Toronto, 1960. (pp. 211-470). ISBN 0070016003.

*Supplementary Text:*

McCain Jr., W.D., The Properties of Petroleum Fluids, 2<sup>nd</sup> edition. The Petroleum Publishing Company, Tulsa, Oklahoma, 1990. ISBN 0878143351.

### **98-Pet-A3 Fundamental Reservoir Engineering**

(Physical Properties and Flow of Fluid through Porous Media)

Porosity, fluid saturations, permeability, interfacial tension, wettability, capillary pressure, effective and relative permeability, steady and unsteady state fluid flow. An introduction to oil and gas material balance equations, drive indices. An introduction to performance prediction techniques.

*Recommended Texts:*

*Prime Text*

Craft, B.C. and Hawkins, M.S. (revised by Terry, R.E.), Applied Petroleum Reservoir Engineering, 2<sup>nd</sup> edition. Prentice-Hall, Englewood Cliffs, N.J., 1991. (pp. 1-53, 56-68, 210-272). ISBN 0130398845.

*Supplementary Text:*

Amyx, J.W., Bass, D.M. and Whiting, R.L., Petroleum Reservoir Engineering. McGraw-Hill, Toronto, 1960. (pp. 36-210). ISBN 0070016003.

### **98-Pet-A4 Oil and Gas Well Drilling and Completion**

Rotary drilling, drilling fluids, drilling hydraulics, penetration rates, drilling techniques, core and core analyses, drillstem testing, casing and cementing procedures, well completion and stimulation.

*Recommended Texts:*

*Prime Text*

Bourgoyne, A.T., Millheim, K.K., Chenevert, M.E. and Young, F.S. Applied Drilling Engineering. Society of Petroleum Engineers, Richardson, TX (1986, 2nd printing 1991). ISBN 9991135979.

*Supplementary Text:*

Gatlin, C., Petroleum Engineering, Drilling and Well Completion. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1960. ISBN 0136621554.

### **98-Pet-A5 Petroleum Production Operations**

Overall view of important steps involved in Petroleum Production Engineering. Inflow performance relationships. Two-phase vertical flow. Decline curve analysis. Other steps include importance of reservoir description, role of effective communication between the reservoir and the well bore, oil and gas separation, well bore damage, fluid movements and vigor of excluding undesirable fluids, workover and stimulation methods, oil well cementing and through tubing logging. Surface facility: storage, separators, emulsions, flow measurement gas hydrates.

*Recommended Texts:*

*Prime Texts:*

M. Economides, A.D. Hill, and C. Ehlig-Economides, Petroleum Production Systems. Order No.

PROD COM047. Society of Petroleum Engineers, Richardson, Texas Tel 1-800-456-6863.  
T.O. Allen and A.P. Roberts, Production Operations, Vol. 1, 4th edition. Order No. PROD COM021. Society of Petroleum Engineers, Richardson, Texas Tel 1-800-456-6863.  
T.O. Allen and A.P. Roberts, Production Operations, Vol. 2, 4th edition. Order No. PROD COM022, Society of Petroleum Engineers, Richardson, Texas Tel 1-800-456-6863.  
H.D.Beggs, Production Optimization Using NODAL\* Analysis. Order No. PROD COM029, Society of Petroleum Engineers, Richardson, Texas Tel 1-800-456-6863.

*Supplementary Texts:*

Kumar, S, Gas Production Engineering. Gulf Publishing Co., 1987.

*N.B. The following is out of print but is an excellent reference:*

Nind, T.E.W., Principles of Oil Well Production, 2<sup>nd</sup> edition. McGraw-Hill Book Co. Ltd., New York, 1981. ISBN 0070465762.

### **98-Pet-A6     Reservoir Mechanics**

Advanced reservoir engineering principles including estimation of reserves, material and volumetric balance, combined driving mechanisms including unsteady state water influx. Performance prediction techniques. Linear material balance and Statistical analysis of unknowns from production history.

*Recommended Texts:*

*Prime Text*

Craft, B.C. and Hawkins, M.S. (revised by Terry, R.E.), Applied Petroleum Reservoir Engineering, 2<sup>nd</sup> edition. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1991. (pp. 146-334, 360-375, 391-424). ISBN 0130398845.

*Supplementary Text:*

Dake, L., Elsevier, Fundamentals of Reservoir Engineering, 1980.

### **98-Pet-A7     Secondary and Enhanced Recovery**

The fluid displacement process. Buckley/Leverett theory. Engineering fundamentals in the principles of secondary recovery; water flooding, miscible displacement methods and thermal recovery techniques.

*Recommended Texts:*

*Prime Texts:*

Craig, F.F., The Reservoir Engineering Aspects of Water<sup>C</sup> flooding. Monograph No. 3, Society of Petroleum Engineers of AIME, 1976. ISBN 0895202026.

Stalkup, Fred, Miscible Displacement. Monograph No.8, Henry Doherty Series, Society of Petroleum Engineers of AIME, 1983. ISBN 0895203197.

Prats, Michael, Thermal Recovery. Monograph No. 7, Henry Doherty Series, Society of Petroleum

Engineers of AIME, 1982. ISBN 0895203146.

*Supplementary Texts:*

Craft, B. C. and Hawkins, M.S. (revised by Terry, R.E.), Applied Petroleum Reservoir Engineering, 2<sup>nd</sup> edition. Englewood Cliffs, N.J., 1991, (pp. 335-386) ISBN 0130398845.

**GROUP B**  
**ELECTIVE EXAMINATIONS (2 REQUIRED)**

**98-Pet-B1 Well Logging and Formation Evaluation**

Theory and engineering and applications of measurements of physical properties of the formation near the well bore, types of well logging devices, interpretation and use of information in petroleum, and natural gas engineering.

*Recommended Texts:*

*Prime Text:*

Helander, D.P., Fundamentals of Formation Evaluation. Oil and Gas Consultants International Inc., 1983. 4554 S. Harvard, Tulsa, OK., 74135. ISBN 0930972023.

*Supplementary Texts:*

Serra, O., Fundamentals of Well-Log Interpretation, Volume 1 - The Acquisition of Logging Data. Elsevier Science Publishers, New York, N.Y., 1984. ISBN 0444421327.

Ellis, D.V., Well Logging for Earth Scientists. Elsevier Science Publishing Co., 1987. ISBN 0135005620.

Dewan, J.T., Essentials of Modern Open-Hole Log Interpretation. Penn Well Books, Tulsa, OK., 1983. ISBN 0878142339.

Log Interpretation Principles/Applications. Available through local offices of Schlumberger of Canada, Current Issue.

Log Interpretation Charts. Available through local offices of Schlumberger of Canada, Current Issue.

**98-Pet-B2 Natural Gas Engineering**

Estimation of reserves; flow measurements; flow through conduits; steady, transient, Darcy and non-Darcy flow through porous media; well testing, back pressure and drawdown tests; deliverability; well interference; phase behaviour in gas and condensate reservoirs. Decline curve analysis.

*Recommended Texts:*

*Prime Text*

John Lee and Robert A. Wattenbarger, Gas Reservoir Engineering. Order No. RESV TEXT005. Society of Petroleum Engineers in Richardson, Texas, Tel: 1-800-456-6863.

Donald L. Katz and Robert L. Lee, Natural Reservoir Engineering: Production and Storage. Order No. PROD COM023, Society of Petroleum Engineers in Richardson, Texas, Tel: 1-800-456-6863.

*Supplementary Texts:*

Ikoku, C.U., Natural Gas Reservoir Engineering. John Wiley & Sons, 1991. Krieger Pr. ISBN 0894646400.

**98-Pet-B3 Oil and Gas Evaluation and Economics**

Oil and gas reserves, conservation, proration, value of money, evaluation nomenclature, payout time, profit ratio, rate of return, capital cost allowance, taxation, oil and gas unitization theory.

*Recommended Texts:*

*Prime Text*

Campbell Petroleum Series, Analysis and Management of Petroleum Investments: Risk, Taxes and Time, 2<sup>nd</sup> edition. Pennwell Publishers, 1991, OK 73072. ISBN 0685547779.

*Supplementary Texts:*

Mineral Property Economics, Vol. 2 and 3 - The Campbells. Campbell Petroleum Series, 1980. ISBN 990667675.

### **98-Pet-B4     Petroleum Geology**

Physical and chemical characteristics of formation waters, natural gas, and crude oil. Origin and modes of occurrence of each of these in the earth. Geography of petroleum and natural gas in Canada, North America, and the world.

*Recommended Texts:*

North, F.K., Petroleum Geology. Allen and Muir Inc., Winchester, MA, 1985. ISBN 041253830X.

### **98-Pet-B5     Well Testing**

Basics of Well Test Interpretation: diffusivity equation, skin, wellbore storage, radius of investigation; different flow regimes: transient, pseudo-steady state, steady state; interpretation of drawdown and build up data for estimating formation permeability, skin, reservoir pore volume, average reservoir pressure; superposition; effect of fault and double porosity systems; derivative analysis; gas well testing.

*Recommended Texts:*

*Prime Texts:*

John Lee, Well Testing. SPE Textbook Series Vol. 1, 1982.

R. N. Horne, Modern Well Test Analysis, 2<sup>nd</sup> edition. Petroway Inc., 1995 (p.1-118). (FE COM 056 SPE Catalog).

*Supplementary Text:*

R. C. Earlougher, Advances in Well Test Analysis. SPE Monograph No. 5, 1977.

**The Association of  
PROFESSIONAL ENGINEERS AND GEOSCIENTISTS  
of British Columbia**

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1998 PETROLEUM ENGINEERING SYLLABUS  
Checklist for Self Evaluation  
(Not for candidates who are assigned  
confirmatory exams)

Name: \_\_\_\_\_

Exam Number	Exam Name	Applicant=s Self-Evaluation - Course Equivalent	For Office Use Only
<i>Basic Studies (6 Required)</i>			
98-BS-1	Mathematics		
98-BS-2	Probability and Statistics		
98-BS-6	Mechanics of Materials		
98-BS-7	Mechanics of Fluids		
98-BS-10	Thermodynamics		
98-BS-14	Geology		
<i>Basic Studies (2 required)</i>			
98-BS-3	Statics and Dynamics		
98-BS-4	Electric Circuits and Power		
98-BS-5	Advanced Mathematics		
98-BS-8	Digital Logic Circuits		
98-BS-11	Properties of Materials		

<b>Group A (7 required)</b>			
98-Pet-A1	Principles of Stratigraphy and Sedimentation		
98-Pet-A2	Petroleum Reservoir Fluids		
98-Pet-A3	Fundamental Reservoir Engineering		
98-Pet-A4	Oil and Gas Well Drilling and Completion		
98-Pet-A5	Petroleum Production Operations		
98-Pet-A6	Reservoir Mechanics		
98-Pet-A7	Secondary and Enhanced Recovery		
<b>Group B (2 Required)</b>			
98-Pet-B1	Well Logging and Formation Evaluation		
98-Pet-B2	Natural Gas Engineering		
98-Pet-B3	Oil and Gas Evaluation and Economics		
98-Pet-B4	Petroleum Geology		
98-Pet-B5	Well Testing		
<b>Complementary Studies (All Required)</b>			
11-CS-1	Engineering Economics		
11-CS-2	Engineering in Society – Health and Safety		
11-CS-3	Sustainability, Engineering and the Environment		
11-CS-4	Engineering Management		