Name:

Enrolment No:

UNIVERSITY OF PETROLEUM & ENERGY STUDIES
DEHRADUN
End Semester Examination- Dec 2019

Program/course: MA Economics (Energy Economics) — **Semester : I**
Subject: QUANTITIVE METHODS IN ECONOMICS — **Max. Marks : 100**
Code : ECON 7002 — **Duration : 3 Hrs**
No. of page/s: 3

Section A (attempt all)

Q1. Answer all the questions:

i.	The total cost of producing Q units of a output is $C(Q) = 3Q^3 – 190Q^2 + 10Q$, $Q \geq 0$. Compute the marginal cost function $C'(Q)$.	**[4]**	**CO1**
ii.	If $\pi(Q) = 35Q+2Q^2 – 1000$ is the profit function, then find the marginal profit	**[4]**	**CO1**
iii.	The revenue function is $R(Q) = 1015Q – 240Q^3$. Find the marginal revenue.	**[4]**	**CO1**
iv.	Find marginal cost when $C(Q) = −2Q3 - 500Q^2 − 1200Q + 500010$	**[4]**	**CO1**
v.	Find marginal cost when $C(Q) = A_1Q^2 + B_1Q + Z_1$	**[4]**	**CO1**

SECTION B

Answer any four questions

Q2.	Answer any one question. i. If the marginal propensity to save (MPS) is the following function of income, $S'(Y) = 0.3 - 0.1Y^{-0.5}$, and if the aggregate saving S is nil when income Y is 81 find the saving function $S(Y)$. ii. Find the elasticity (E_d) if the demand function is: Q=250-5P. Determine whether the demand is elastic at P = 20.	**[5]**	**CO3, CO4**
Q3.	The supply function of certain commodity is: $Q_s=A+BP^2+R^{0.5}$ (a<0, b>0). Where, Q_s is quantity supplied, P is price and R is rainfall. Find price elasticity of supply (E_s) and rainfall elasticity of supply (E_r).	**[5]**	**CO3, CO4**

Q4	Use Jacobian determinants to test the existence of functional dependence between the paired functions. $$y_1 = 4x_1^2 + 3x_2^2$$ $$y_2 = 6x_1 + 2$$	**[5]**	**CO3, CO4**
Q5.	Using implicit function rule find $\frac{dy}{dx}$ of the following function. $$F(x,y) = 25x^2 + 12xy + 5x^3 = 0$$	**[5]**	**CO3, CO4**
Q6.	Find the total differential, given, $U = \frac{X_1}{X_1+X_2}$	**[5]**	**CO3, CO4**
	SECTION C **Answer any two questions**		
Q7.	Answer any one question i. Let the demand and supply be: $$Q_d = \alpha - \beta P - n\frac{dP}{dt}; \quad Q_s = \delta P \quad (\alpha, \beta, n, \delta > 0)$$ Assume that the market is cleared at every point of time, find the time path P(t) (general solution) Does this market have a dynamically stable intertemporal equilibrium price? Examine. ii. Find the partial total derivatives $\frac{\delta w}{\delta u}$ and $\frac{\delta w}{\delta v}$ if $w = ax^2 + bxy + cu$, where $x = \alpha u + \beta v$ and $y = \gamma u$. (Use channel Map)	**[15]**	**CO3, CO4**
Q8.	Describe and show in graph the market model of change in equilibrium price using comparative static analysis.	**[15]**	**CO3, CO4**
Q9.	What do you mean by comparative static analysis? Explain with example role of differention in comparative static analysis.	**[15]**	**CO3, CO4**

	Section D **Answer the question**		
Q10	A firm has the following total cost and demand functions: $C = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 50$; $Q = 100 - P$ a. Does the total cost function satisfy the coefficient restrictions? b. Write out total revenue function R in terms of Q. c. Formulate the total profit function π in terms of Q. d. Find profit maximization level of output Q^*. e. What is the maximum profit?	**[30]**	**CO2, CO3, CO4**