International Islamic University Chittagong

Department of Economics & Banking

Semester End Examination, Spring-2023 | Program: BSS (Hons) in Economics & Banking

Course Code: MATH-3503 | Course Title: Mathematics for Economists

Time: 2 hours 30 minutes | Full Marks: 50

Answer the following questions. All parts of a question must be answered sequentially. Figures in the right margin indicate full marks.

QN	Description of Questions	Marks	CLO PLO	Cognitive learning
1.	Consider the following two models. Let, the rate of change in price is directly proportional to excess demand. **Formulate** the time path of price and evaluate whether the time paths are dynamically stable or not. **(i)** $Q_d = g - hP \quad Q_s = -m + nP(g, h, m, n > 0)$ **(ii)** $Q_d = 100 - 2P \quad Q_s = 3P$ **[Adjustment coefficient= 0.7 and** $P(0) = 50$**]**	10	CLO1 PLO1	Create
	OR			
1.	**Design**the general solution and definite solution of the following differential equations. *i)* $\frac{dy}{dt} + 6y = -e^t$; $\quad y(0) = 6/7$ *ii)* $\frac{dy}{dt} + 4ty = 4t$; $\quad y(0) = 10$	10	CLO1 PLO1	Create
2(a)	**Verify** that the following differential equations is exact, and solve by the four steps procedure: $\frac{dy}{dt} + \frac{2y^4t + 3t^2}{4y^3t^2} = 0$	05	CLO3 PLO1	Evaluate
2(b)	Is the following differential equation exact? If not, try t, y and y^2 as possible integrating factors and **solve** by the four steps procedure. $2t^3dy + 3yt^2dt = 0$	05		Apply
3	Let the equation, $y_{t+1} - \alpha y_t = -\beta$ $(y_t = y_0 \; when \; t = 0)$ (i) How can you define the above equation? (ii) Solve the equation by iteration. (iii) Find complementary function (y_c), particular integral (y_p), general solution and definite solution by using general method. Check the validity of your answer.	10	CLO3 PLO1	Evaluate
4	Let the difference equation, $y_{t+1} + \gamma y_t = \varepsilon$ (i) **Calculate** the general and definite solutions when , $\gamma \neq -1$ (ii) What will be the general solution and definite solution when, $\gamma = -1$? (iii) Describe the stability condition(s) of (i) and (ii)	10	CLO3 PLO1	Create
5(a)	**Specify** the lagged supply functions with suitable examples.	02		Understand
5(b)	Given the demand and supply functions for the Cobweb model as follows. **(i)** $Q_{dt} = 22 - 3P_t \quad Q_{st} = -2 + P_{t-1}$ **(ii)** $Q_{dt} = 3 - P_t \quad Q_{st} = 4P_{t-1} - 3$ **Formulate** time paths, intertemporal equilibrium price and deviation from equilibrium.	08	CLO6 PLO3	Create
	OR			
5(a)	Briefly **discuss** the necessity of linear programming in optimization.	02		Understand
5(b)	Kohinoor Apparels, a medium-scale export-oriented garment factory located in Chittagong, produces sweaters and jackets. Each unit of sweater production requires 2 hours of use of machine I and 4 hours of use of machine II. Each unit of jacket production, however, requires 4 hours of machine I and 2 hours of machine II. Machine I can be used for a maximum of 120 hours per week, and machine II for 80 hours. Sweater and jacket yield net profit flows at the rate of 4 and 3 dollars per unit, respectively. **Prepare** the necessary equations and graphs to find out the profit-maximising quantities of sweaters and jackets.	08	CLO6 PLO3	Create