**BMA 3104**

**Cat 1 and 2**

**ANSWER ALL THE QUESTIONS**

**Question I (10 marks)**

1. Distinguish between Time series analysis in the time domain and time series analysis in the frequency domain. (4mks)
2. Determine whether the process $X\_{t}=0.6x\_{t-1}-0.5x\_{t-2}+ε\_{t}-0.4ε\_{t-1}+0.2ε\_{t-2}$ is stationary and invertible. (5mks)

**Question ii (10 marks)**

1. Describe the concept of stationality of time series. (**2mks**)
2. Estimate trend from the following time series (assuming a linear trend) and estimate the number of units in 1991. Use t = year 1983

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
| Production units Xt | 125 | 125 | 133 | 135 | 140 | 141 | 143 |

(6mks)

1. If {xt} has $\sum\_{h=-α}^{α}\left|γ\_{x}(h)\right|<α$ define its spectral density (**2marks**)

**Question iii (10 marks)**

1. Given the seasonal index for four periods as 85, 101,104 and 110 corresponding to 1st quarter , 2nd quarter, 3rd quarter, 4th quarter respectively With a regression equation as xt= 1500+185t. work out seasonally adjusted sales for a company for the 3nd quarter. And 4th quarter . (**3marks**)
2. Given an exponential curve Xt = abt. where a and b are constants.

Explain how to apply least square and list the normal equations. {**4marks**}

1. Find the auto covariance of the following time series Xt = wt+ 5/4wt-1-9/4wt-2 where WN(0,1). (3**marks)**