This question paper contains 4 printed pages.]

5132 *Your Roll No. .....*

B.Sc. (Prog.) / III **B**

OPERATIONAL RESEARCH

OR-302 : FORECASTING

(Admissions of 2005 & onwards)

Time : 3 Hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

*Attempt any **five** questions.*

All questions carry equal marks.

Simple calculator is allowed.

1. (a) What are the various steps that are carried out in forecasting process ? 7

(b) Differentiate between additive and multiplicative decomposition model of time series and explain the need to analyze the time series. 8

2. Define autocorrelation and autocorrelation coefficient. Compute autocorrelation for time lag 1 for the following data and test to determine whether it is

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significantly different from zero at 0.01 significance level. 15

Time (t)	1	2	3	4	5	6	7	8	9	10	11
Y_t	2413	2407	2403	2396	2403	2448	2371	2362	2334	2362	1954

3. What are the various measures of forecast error generated by forecasting techniques ? Differentiate between them. Compute the forecast for each period for the following data by using naive, and three period moving average method.

(t)	1	2	3	4	5	6	7	8
Y_t	200	210	215	216	219	220	225	226

Evaluate these forecasting methods using MAD, MSE, MAPE and MPE and forecast for the period 10 by using best technique. 15

4. How can one determine if a single, double or triple exponential smoothing technique is the best for one's data ?

Describe single exponential smoothing method and forecast for each period of the following data :

(t)	1	2	3	4	5	6	7	8	9	10
Y_t	49	52	47	50	51	46	46	50	54	49

Does a smoothing constant $\alpha = 0.05$ or 0.9 produce a smoother forecast series ? Explain. Which one is best smoothing constant ? 15

5. Fit a straight line trend to the following data by method of least squares and obtain two monthly trend values for November 2005 and September 2006. 15

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Average monthly profit (Crores Rs.)	12.6	14.8	18.6	14.8	16.6	21.2	18	17.4	15.8

6. Distinguish between 'Ratio to trend' and 'Ratio to moving average' as methods of measuring seasonal variations. Which is better and why ?

From the following data calculate seasonal indices using 'Ratio to moving average' method : 15

Year	I	II	III	IV
2006	72	68	80	70
2007	76	70	82	74
2008	74	66	84	80

7. Mr. X, the manager of the supermarket chain, would like to be able to forecast paperback book sales based on the amount of shelf display space (feet) provided. The data was gathered for a sample of 11 weeks as follows : 15

Week	1	2	3	4	5	6	7	8	9	10	11
No. of Books sold (y)	275	142	168	197	215	188	241	295	125	266	200
Feet of shelf space (x)	6.8	3.3	4.1	4.2	4.8	3.9	4.9	7.7	3.1	5.9	5

(a) Forecast no. of books sold for a week during which 4 feet of shelf space provided with 90% prediction interval.

(b) Determine ANOVA table and test for significance of regression using F statistic from ANOVA table at 0.01 significance level.