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t	D_t	Moving Avg. F_t	Weighted Moving Avg F_t	Exp. smoothing F_t
1	400	—	—	400
2	420	—	—	400
3	450	—	—	404
4	410	423.33	431	413.20
5	480	443.33	449	422
6	500	463.33	468	434
7	530	480	486	447
8	550	503.33	511	463.70
9	580	526.66	534	481
10	600	533.33	561	500.80
11		576	584	520.6

(i) Moving Average :-

(a) $MAD = \frac{\sum |A_t - f_t|}{n} = \frac{\sum |D_t - F_t|}{7} = 43.8095$

(b) $MSE = \frac{\sum (A_t - f_t)^2}{n-1} = \frac{\sum (D_t - F_t)^2}{6} = 2288.89$

(c) $MAPE = \frac{\sum \frac{|A_t - F_t|}{A_t} \times 100}{n} = 8.26\%$ Ans

(ii) Weighted Moving Average :-

(a) $MAD = \frac{\sum |A_t - F_t|}{n} = 37.1429 \quad \{n = 7\}$

(b) $MSE = \frac{\sum (D_t - F_t)^2}{n-1} = \frac{9920}{6} = 1653.33$

(c) $MAPE = \frac{\sum \frac{|A_t - F_t|}{A_t} \times 100}{n} = \frac{0.4898651}{7} \overset{(\times 100)}{=} (0.0699 \times 100)$

$= 7\%$ Ans

(iii) Exponential smoothing:-

(a) $MAD = \frac{\Sigma |A_t - F_t|}{n} = \frac{604.3}{9} = 67.144$

(b) $M.S.E = \frac{\Sigma (A_t - F_t)^2}{n-1} = \frac{46404.6}{8} = 5800.57$

(c) $MAPE = \frac{\Sigma \left|\frac{A_t - F_t}{A_t}\right| \times 100}{n} = \frac{1.15395 \times 100}{9} = 12.82\%$ Ans

(iv) Linear Regression:-

x_i	y_i	$x_i y_i$	x_i^2	$\hat{y_i}$
1	400	400	1	397.45
2	420	840	4	419.57
3	450	1350	9	441.69
4	460	1840	16	463.81
5	480	2400	25	485.93
6	500	3000	36	508.05
7	530	3710	49	530.17
8	550	4400	64	552.29
9	580	4320	81	574.41
10	600	6000	100	596.53
11				618.65
12				640.77

(a) $MAD = \frac{\Sigma |y_i - \hat{y_i}|}{10} = \frac{40.6}{10} = 4.06$

(b) $MSE = \frac{\Sigma (y_i - \hat{y_i})^2}{9} = \frac{238.789}{9} = 26.532$

(c) $MAPE = \frac{\Sigma \left|\frac{y_i - \hat{y_i}}{y_i}\right| \times 100}{10} = \frac{0.082507}{10-1} = 0.825\%$ Ans

By MAPE, the best method to use will be linear regression.