

COLLEGE OF ENGINEERING, PUNE
M. Tech. (Construction Management)
End Semester Examination, (Semester- I) 2013-14
[CM-607] Probability & Data Analysis

[Time: 3 Hours]

[Max. Marks: 60]

Instructions to Candidates:

- a) Attempt **any five Questions** and all questions carry equal marks
- b) Use of non-programmable scientific calculators and statistical tables is allowed
- c) Neat diagrams must be drawn wherever necessary
- d) Assume suitable data if necessary
- e) Figures to the right indicate full marks

- Q.1. An experiment was run to determine whether four specific firing temperatures affect the density of a certain type of brick. The experiment led to the following type of data. (10)

Temperature °F	Density Obs. No.1	Density Obs. No.2	Density Obs. No.3	Density Obs. No.4
100	21.8	21.9	21.7	21.6
125	21.7	21.4	21.5	21.5
150	21.9	21.8	21.8	21.6
175	21.9	21.7	21.8	21.7

Use one way ANOVA at to test the hypothesis at $\alpha = 0.05$. Does the firing temperature affect the density of the bricks?

- Q.2. The manager of a fleet of automobiles is testing two brands of radial tires and assigns one tire of each brand at random to the two rear wheels of eight cars and runs the cars until the tires wear out. The data in Kilometers is as follows (10)

Car	Brand 1	Brand 2
1	36925	34318
2	45300	42280
3	36240	35500
4	32100	31950
5	37210	38015
6	48360	47800
7	38200	37810
8	33500	33215

Is there significant difference in mean life of tyres of two brands? Which brand would you prefer, based on this calculation? Use $\alpha = 0.05$

- Q.3. At a construction site, the amount of time taken for casting of a slab is normally distributed with a mean of 8 hours and a standard deviation of 2 hours. Find the probability that the time taken for one slab to be constructed in one go. (10)
- a) More than 9 hours.
 - b) More than 6 hours.
 - c) Less than 10 hours.
 - d) Between 7 to 9 hours.
 - e) Less than 5 hours

Q.4. The following is the data on the fretting wear of mild steel and oil viscosity. (10)

Oil Viscosity X	Wear Volume (10^{-4} Cubic mm) Y
1.6	240
9.4	181
15.5	193
20.0	155
22.0	172
35.5	110
43.0	113
40.5	75

Fit the simple linear regression model and predict fretting wear when Viscosity $X=30$. Also find out coefficient of correlation. Conduct F test to find out whether linear regression exists. Use $\alpha = 0.05$

Q.5. The deflection temperature under load for two different types of plastic type is being investigated. Two random samples of 15 pipe specimens are tested, and the deflection temperatures observed are as follows (in $^{\circ}\text{F}$) (10)

Type I	Type 2
206	177
188	197
205	206
187	201
194	180
193	176
207	185
185	200
189	197
213	192
192	198
210	188
194	189
178	203
205	192

Assume that both population variances are equal, do the data support the claim that the deflection temperature under load for Type 2 pipe exceeds that of Type 1? Use $\alpha = 0.05$

Q.6 Number of power cuts per week in an architectural firm on an average is 5, then what is the probability that there are: (10)

- exact 8 power cuts in a given week
- atleast 2 power cuts in a given week
- atmost 2 power cuts in a given week
- less than 3 power cuts in a given week
- more than 4 power cuts in a given week

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