M A DEGREE END SEMESTER EXAMINATION APRIL – 2016

SEMESTER- 2: ECONOMICS

COURSE: P2ECOT10 – QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS – II

(Common for Regular- 2015 Admission /Supplementary- 2014 Admission)

Part A (Each carries 2 marks)

1. $P(x) \geq 0$, $\Sigma P(x) = 1$ — 1 mark

Conditions are satisfied. ∴ Prob. distribution — 1 mark

2. Any three properties. — 2 marks

$E(k) = k$, a constant.

$E(kx) = kE(x)$

$E(x+y) = E(x) + E(y)$

and $E(xy) = E(x)E(y)$ if x & y are independent.

3. $P(x) = nCx\, p^x q^{n-x}$; $0<p<1$, $p+q=1$, $x=0,1\cdots$

or mean $= np$, Variance $= npq$. — 1 mark

$\frac{npq}{np} = q = \frac{5}{4} > 1$ which violates the condition that $0<q<1$. For a binomial mean > Variance. — 1 mark

4. Estimation — 1 mark ; Testing — 1 mark

5. Definitions — 2 marks

Part B. (5 × 7 = 35 marks)

each question carries 5 marks

6. $\Sigma P(x) = 1$

$.4 + 6k = 1$ ∴ $k = .1$ — 1 mark

Mean, $E(x) = .5$ and $E(x^2) = \Sigma x^2 P(x) = 3$. — 2 marks

$V(x) = E(x^2) - [E(x)]^2 = 2.86$ (2 marks)

7. a) $E(4X) = 4E(X) = 4\mu$
$V(4X) = 4^2 V(X) = 16\sigma^2$] – 2 marks

b) $E[4X+3] = 4\mu + 3$
$V[4X+3] = 16\sigma^2$] – 2 marks

c) $V[3X+2Y] = 9V(X) + 4V(Y)$
$= 9\times 2 + 4\times 3 = 20$] 1 mark

8. $p = .1$, $q = .9$

$P(X \le 2) = \sum_{x=0}^{2} nCx\, p^x q^{n-x}$] – 2.5 marks

$= \binom{10}{0}\left(\frac{1}{10}\right)^0\left(\frac{9}{10}\right)^{10} + \binom{10}{1}(.1)^1(.9)^9 + \binom{10}{2}(.1)^2(.9)^8$] – 2.5 marks

$= \left(\frac{24}{9}\right)(.9)^{10}$

9. Definition – 3 marks
Application – 2 marks

10 4 properties – 5 marks

11 $\bar{x} = 53$, $S = 3$, $n = 6$, $SE = \frac{S}{\sqrt{n}} = \frac{3}{4}$] 2 ma

95% C.I for population mean is

$(\bar{x} \pm t_{\alpha/2} SE) = 53 \pm 2.131 \times .75$
$= 53 \pm 1.598$
$= (51.4, 54.6)$] – 3 marks

12 Simple and Composite – 2.5 marks
Type I and Type II errors – 2.5 "

13 Standared error – 2 marks
Uses – 3 "

14 Paired t test — 5 marks

15 Goodness of fit — 5 "

Part C (Each question carries 15 marks)

15 × 2 = 30 mar

16 Properties (at least 7) — 5 marks

$\mu = 58, \sigma = 10, Z = \frac{x-\mu}{\sigma}$

a) $P(x < 63) = P(Z < .5) = .6915$

b) $P(41 < x < 63) = P(-1.7 < Z < .5) = .6469$

c) $P(50 < x < 60) = P(-.8 \leq Z < .2)$

$= .3764$ ~~0.3674~~

d) $P(x > 60) = P(Z > 1) = .1587$

2½ each

17. Paired t test — 5 marks

$\bar{d}$ and S — 2.5 + 2.5

Calculated t — 2

Tabled t — 2

Conclusion — 1

Student :	A	B	C	D	E	F	G	H	I	J
Test I :	10	8	7	9	8	10	9	6	7	8
Test II :	12	8	8	10	8	11	9	8	9	9

difference of the scores

d_i :	−2	0	−1	−1	0	−1	0	−2	−2	−1 / 16
d_i^2 :	4	0	1	1	0	1	0	4	4	1 / 16

Test statistic is $t = \frac{\bar{d}}{SE}$ where $SE = \frac{S}{\sqrt{n}}$

$\bar{d} = \frac{-1}{}$, $S = \sqrt{\frac{\Sigma d^2}{n} - \bar{d}^2} = \frac{\sqrt{.6}}{}$; $|t| = 3.8$

$t = 2.262$. $|t| > t$ ∴ Reject H_0

18. Tests of independence — 5 marks.

The expected frequency corresponding to the cell frequency is less than 5. Hence Yates' correction could have to be applied.

H_0 : the stature of son is independent of the stature of father

H_1 : H_0 is not true

Under Yates' Correction

7.5	2.5	10
7.5	5.5	13
15	8	23

The statistic $\chi^2 = \dfrac{23(7.5 \times 5.5 - 7.5 \times 2.5)^2}{10 \times 13 \times 15 \times 8}$

$= .746$

For $\alpha = .05$, $\chi^2_{.05} = 3.841$

Since the calculated value of χ^2 < tabled value we accept the H_0.

It reveals that the stature of sons is independent of the stature of their fathers.

Yates correction — 2
H_0 and Test statistic — 3
Calculated χ^2 — 2
Tabled value — 2
Conclusion — 1