OR iv. In a sample of 1000 cases, the mean of certain test is 14 and S.D. is 25. Assuming the distribution is normal. Find **5**

(a) How many students score between 12 and 15?
Given, A(z=0.08)=0.0319, A(z=0.04)=0.0160

(b) How many scores above 18?
Given, A(z=0.16)=0.0636

(c) How many scores below 8?
Given, A(z=0.24)=0.0948

Q.6 Attempt any two:

i. Among 64 off springs of a certain cross between European horses 34 were red, 10 were black and 20 were white. According to a genetic model, these numbers should be in the ratio 9:3:4. Is the data consistent with the model at 5% level $\left(\chi^2_{2;0.05} = 5.991\right)$ **5**

ii. Find the student's t for the following variable values in a sample of eight: -4, -2, -2, 0, 2, 2, 3, 3 taking the mean of the universe to be zero. **5**

iii. Two independent samples of 8 and 7 items respectively had the following values of the variable (weight in cunces): **5**

Sample I	9	11	13	11	15	9	12	14
Sample II	10	12	10	14	9	8	10	

Do the two estimates of population variance differ significantly? Given that for (7,6) d.f. the value of F at 5% level of significance is 4.20 nearly.

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No......................................

Faculty of Engineering

End Sem (Odd) Examination Dec-2018

CA3CO11 Mathematics-III

Programme: BCA Branch/Specialisation: Computer Application

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Jacobi's method is also known as **1**

(a) Displacement method
(b) Simultaneous displacement method
(c) Simultaneous method
(d) Diagonal method

ii. The convergence of which of the following method is sensitive to starting value? **1**

(a) False position (b) Gauss seidal method
(c) Newton-Raphson method (d) All of these

iii. Lagrange's polynomial through the points **1**

x	0	1
y	4	3

is given by

(a) y= 2x-3 (b) y= x+4 (c) y = -x+3 (d) y = -x+4

iv. For f(x)= x^2, h=2, second forward difference $\Delta^2 f(x)$ is given by **1**

(a) 6 (b) 12 (c) 4 (d) 8

v. Differential equation $\frac{dy}{dx}$ = x+y, with y(0) = 0, h = 0.2 is to be solved using Euler's method. The value of y at x=0.4 is given by **1**

(a) 0.4 (b) 0 (c) 0.04 (d) 0.2

vi. The highest order of polynomial integrand for which Simpson's $\frac{1}{3}$ rule of integration is exact is **1**

(a) First (b) Second (c) Third (d) Fourth

vii. A throw is made with two dice. The probability of getting a score of 10 points is **1**

(a) $\frac{1}{12}$ (b) $\frac{1}{6}$ (c) $\frac{1}{5}$ (d) $\frac{2}{3}$

viii. If n = 10 and p= 0.8, then the mean of the binomial distribution is **1**

(a) 0.08 (b) 1.26 (c) 1.60 (d) 8.00

ix. If observed frequencies O_1, O_2, O_3 are 5, 10, 15 and expected frequencies e_1, e_2, e_3 are each equal to 10 then χ_2^2 has the value **1**

(a) 20 (b) 10 (c) 15 (d) 5

x. Test to be applied when number of observations are less than 30 and variance is not known is said to be **1**

(a) Chi Square test (b) T-test (c) F- test (d) None of these

Q.2 i. Evaluate the sum S = $\sqrt{3}+\sqrt{5}+\sqrt{7}$ to 4 significant digits and find its absolute and relative errors. **2**

ii. Find the real positive root of the equation $x^4 - x - 9 = 0$ by Newton-Raphson method, correct to three places of decimal. **3**

iii. Find the real root of the equation $xe^x - 3 = 0$ by RegulaFalsi method, correct to three decimal places. **5**

OR iv. Solve the following system of equations by Gauss Seidal Method **5**

28a + 4b –c = 32

a + 3b + 10c= 24

2 a + 17 b + 4c = 35

Q.3 i. Show that $\Delta\nabla = \nabla\Delta$. **2**

ii. Find value of y for x=0.5 for the following table of x,y values using Newton's forward difference formulae. **3**

x	0	1	2	3	4
y	1	5	25	100	250

iii. Using Lagrange's interpolation formula, find the values of y when x=10, from the following table: **5**

x	5	6	9	11
y	12	13	14	16

OR iv. Find the first, second and third derivatives of the function tabulated below, at the point x=1.5 **5**

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24.0	38.875	59.0

Q.4 i. A function f(t) is described by the following experimental data at equally spaced intervals **3**

t	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
f(t)	93	87	68	55	42	37	35	39	48	53	51

Evaluate the integral $I = \int_0^1 f(t)dt$ by Simpson's $\frac{1}{3}$ rd rule.

ii. Solve the equation $2\frac{d^2y}{dx^2} = 3x\frac{dy}{dx} - 9y + 9$, subject to the conditions y(0) =1, y'(0) = -2 using Euler's method and compute y for x = 0.1 and 0.2. **7**

OR iii. Using fourth order Runge-Kutta method, solve the equation $\frac{dy}{dx} = \sqrt{x+y}$, subject to the conditions x=0, y=1 and find y at x=0.2 taking h = 0.1. **7**

Q.5 i. Two cards are drawn from a well shuffled pack of 52 cards. Find the probability that they are both kings, if the first card drawn is replaced. **2**

ii. In a Poisson distribution, if P(r=1) = 2P(r=2), Find P(r=3) **3**

iii. Assume that on the average one telephone number out of fifteen called between 2 P.M. and 3 P.M. on week days is busy. What is the probability that if 6 randomly selected telephone numbers are called **5**

(a) Not more than three,

(b) At least three of them will be busy?

Q.1 (i) (b) Simultaneous displacement Method +1
(ii) (c) Newton-Raphson method +1
(iii) (d) $y = -x+4$ +1
(iv) (d) 8 +1
(v) (c) 0.04 +1
(vi) (b) second +1
(vii) (a) 1/12 +1
(viii) (d) 8 +1
(ix) (d) 5 +1
(x) (b) T-test. +1

Q.2 (i) $\sqrt{3} = 1.732$, $\sqrt{5} = 2.236$, $\sqrt{7} = 2.646$

Sum $S = 6.614$

$E_a = 0.0005 + .0005 + .0005 = .0015$ +1

The total Absolute error shows that the sum is correct to three significant figures only

$\therefore$ we take $S = 6.61$

the

$$E_r \text{ (Relative error)} = \frac{.0015}{6.61} = 0.0002$$ +1

Q.2 (ii) Let $f(x) = x^4 - x - 9$

$f(1) = -9 = \ominus$ive

$f(2) = 5 = \oplus$ive

clearly $f(1)$ and $f(2)$ are of opposite sign

$\therefore$ root of eq^n lies between 1 and 2.

Take initial approximation $x_0 = \frac{1+2}{2} = 1.5$ +1

By Newton Raphson method

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$ 1/2

$$x_{n+1} = \frac{3x_n^4 + 9}{4x_n^3 - 1}$$

Put $n=0$

$x_1 = 1.935$

$n = 1, \quad x_2 = 1.8248$ 1/2

$n = 2, \quad x_3 = 1.8135$

$n = 3, \quad x_4 = 1.8134$

$n = 4 \quad x_5 = 1.8134$ +1

Q.2 (iii) Given $f(x) = xe^x - 3$

$f(1) = e - 3 = -.282 = \ominus$ive

$f(2) = 11.778 = \oplus$ive

$\therefore$ root lie between 1 and 2 +1

Taking $x_1 = 1 \quad x_2 = 2$

$f(x_1) = -.282 \quad f(x_2) = 11.778$

First approximation

$$x_3 = x_1 - \frac{x_2 - x_1}{f(x_2) - f(x_1)} f(x_1)$$ +1

$$x_3 = x_1 - \frac{x_2 - x_1}{f(x_2) - f(x_1)} f(x_1)$$

$$= \cancel{1 - \frac{2-1}{\cdot 7183}}$$

$$= 1 - \frac{2-1}{11\cdot778 - (-\cdot282)} (-\cdot282)$$

$$= 1 + \frac{\cdot282}{12\cdot06} = 1\cdot0234$$

$$f(x_3) = f(1\cdot0234) = -\cdot1522$$ +1

As $f(x_2)$ and $f(x_3)$ are of opposite sign
∴ root lies b/w x_3 and x_2.

Now $x_1 = 1\cdot0234$, $x_2 = 2$
$f(x_1) = -\cdot1522$ $f(x_2) = 11\cdot778$

$$x_4 = x_1 - \frac{x_2 - x_1}{f(x_2) - f(x_1)} f(x_1)$$

$$= 1\cdot0234 - \frac{2 - 1\cdot0234}{11\cdot778 + \cdot1522} (-\cdot1522)$$

$$= 1\cdot0234 + \frac{(\cdot9766)(\cdot1522)}{11\cdot9302}$$

$$x_4 = 1\cdot0358$$

$$f(x_4) = f(1\cdot0358) = -\cdot0817$$ +1

As $f(x_2)$ & $f(x_4)$ are of opposite signs.
∴ root lies b/w x_2 and x_4.

Now $x_4 = 1.0358$ $x_2 = 2$
$f(x_4) = -.0817$ $f(x_2) = 11.778$

$$x_5 = 1.0358 - \frac{(2 - 1.0358)(-.0817)}{11.778 + .0817}$$

$$= 1.0358 + \frac{(.9642)(.0817)}{11.8597}$$

$$= 1.0358 + .00066$$

+1

$$x_5 = 1.036$$

Q. 2 (iv) Eq^{n}s are rearranged as follows

$$a = \frac{1}{28}(32 - 4b + c)$$

$$b = \frac{1}{17}(35 - 2a - 4c)$$

$$c = \frac{1}{10}(24 - a - 3b)$$

+1

Start with $b = 0, c = 0$,
First iteration

$$a^{(1)} = \frac{1}{28}(32) = 1.1429$$

$$b^{(1)} = 1.9244$$

$$c^{(1)} = 1.8084$$

Second iteration

$$a^{(2)} = .9325$$

$$b^{(2)} = 1.5236$$

$$c^{(2)} = 1.8497$$

+2

Third iteration

$$a^{(3)} = .9913$$
$$b^{(3)} = 1.5070$$
$$c^{(3)} = 1.8488$$

+1

Fourth iteration :- $a^{(4)} = .9936$

$$b^{(4)} = 1.5069$$
$$c^{(4)} = 1.8486$$

Fifth iteration :- $a^{(5)} = .9936$

$$b^{(5)} = 1.5069$$
$$c^{(5)} = 1.8486.$$

Since 4^{th} and 5^{th} iteration are same, we get
$a = .9936$, $b = 1.5069$, $c = 1.8486$ +1

Q.3 (i) $\Delta\nabla = \nabla\Delta$

L.H.S

$$\Delta\nabla f(x) = \Delta[f(x) - f(x-h)]$$
$$= \Delta f(x) - \Delta f(x-h)$$
$$= f(x+h) - f(x) - [f(x-h+h) - f(x-h)]$$
$$= f(x+h) - f(x) - f(x) + f(x-h)$$
$$= f(x+h) - 2f(x) + f(x-h) \quad \text{--- (1)}$$

+1

R.H.S

$$\nabla\Delta f(x) = \nabla[f(x+h) - f(x)]$$
$$= \nabla f(x+h) - \nabla f(x)$$
$$= [f(x+h) - f(x+h-h)] - [f(x) - f(x-h)]$$
$$= f(x+h) - 2f(x) + f(x-h)$$
$$\text{--- (2)}$$

+1

from eq^n (1) and (2)

$$\Delta\nabla = \nabla\Delta.$$

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Q.3 (ii)

x	y	Δy	$\Delta^2 y$	$\Delta^3 y$	$\Delta^4 y$
0	$\boxed{1}$				
		$\boxed{4}$			
1	5		$\boxed{16}$		
		20		$\boxed{39}$	
2	25		55		$\boxed{-19}$
		75		20	
3	100		75		
		150			
4	250				

1½

$$u = \frac{x-a}{h} \quad \text{Here } x = 0.5 \quad a = 0$$
$$h = 1$$

$u = 0.5$

$$f(a+uh) = f(a) + u\,\Delta f(a) + \frac{u(u-1)}{2!}\Delta^2 f(a) +$$
$$+ \frac{u(u-1)(u-2)}{3!}\Delta^3 f(a) + \frac{u(u-1)(u-2)(u-3)}{4!}\Delta^4 f(a) + \cdots$$ ½

$$f(x) = f(0.5) = 1 + (0.5)(4) + \frac{(.5)(-.5)}{2}16 +$$
$$+ \frac{(.5)(-.5)(-1.5)(39)}{6} + \frac{(.5)(-.5)(-1.5)(-2.5)(-19)}{24}$$

$$= 1 + 2 - 2 + 2.4375 + .742$$

$f(0.5) = 4.1795$ 1

Q.3 (iii) $x_0 = 5,\ x_1 = 6,\ x_2 = 9,\ x_3 = 11$

$y_0 = 12,\ y_1 = 13,\ y_2 = 14,\ y_3 = 16$ +1

Find $y = f(x) = ?$ when $x = 10$

By Lagrange's Interpolation formula

$$y = f(x) = \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_0-x_1)(x_0-x_2)(x_0-x_3)} f(x_0) + \frac{(x-x_0)(x-x_2)(x-x_3)}{(x_1-x_0)(x_1-x_2)(x_1-x_3)} f(x_1)$$

$$+ \frac{(x-x_0)(x-x_1)(x-x_3)}{(x_2-x_0)(x_2-x_1)(x_2-x_3)} f(x_2) + \frac{(x-x_0)(x-x_1)(x-x_2)}{(x_3-x_0)(x_3-x_1)(x_3-x_2)} f(x_3)$$ 1½

$$\Rightarrow y = f(10) = \frac{(10-6)(10-9)(10-11)}{(5-6)(5-9)(5-11)}(12)$$

$$+ \frac{(10-5)(10-9)(10-11)}{(6-5)(6-9)(6-11)}(13) + \frac{(10-5)(10-6)(10-11)}{(9-5)(9-6)(9-11)}(14)$$

$$+ \frac{(10-5)(10-6)(10-9)}{(11-5)(11-6)(11-9)}(16)$$ 1½

$$= \frac{(4)(1)(-1)(12)}{(-1)(-4)(-6)} + \frac{(5)(1)(-1)(13)}{(1)(-3)(-5)} + \frac{(5)(4)(-1)(14)}{(4)(3)(-2)}$$

$$+ \frac{(5)(4)(1)(16)}{(6)(5)(2)}$$

$= 2 - 4.333 + 11.666 + 5.333$

$\boxed{y = 14.666}$ +1

Q.3 (iv)

x	y	Δy	$\Delta^2 y$	$\Delta^3 y$	$\Delta^4 y$
1.5	$\boxed{3.375}$				
		$\boxed{3.625}$			
2	7		$\boxed{3}$		
		6.625		$\boxed{.75}$	
2.5	13.625		3.75		0
		10.375		.75	
3	24		4.5		0
		14.875		.75	
3.5	38.875		2.25		
		20.125			
4	59				

+2

$$\left(\frac{dy}{dx}\right)_{x=x_0} = \frac{1}{h}\left\{\Delta y_0 - \frac{1}{2}\Delta^2 y_0 + \frac{1}{3}\Delta^3 y_0 - \frac{1}{4}\Delta^4 y_0\right] \quad \text{—(I)}$$

$$\left(\frac{d^2y}{dx^2}\right)_{x=x_0} = \frac{1}{h^2}\left[\Delta^2 y_0 - \Delta^3 y_0 + \frac{11}{12}\Delta^4 y_0\right] \quad \text{— II}$$

$$\left(\frac{d^3y}{dx^3}\right)_{x=x_0} = \frac{1}{h^3}\left\{\Delta^3 y_0 - \frac{3}{2}\Delta^4 y_0\right] \quad \text{—(III)}$$

1½

$\Delta y_0 = 3.625$, $\Delta^2 y_0 = 3$ $\quad \Delta^3 y_0 = .75$ $\quad \Delta^4 y_0 = 0$
$h = .5$,

∴ eq^n (I) becomes

$$\left(\frac{dy}{dx}\right) = \frac{1}{.5}\left[3.625 - \frac{1}{2}(3) + \frac{1}{3}(.75) - \frac{1}{4}\times 0\right] = 4.75$$

$$\left(\frac{d^2y}{dx^2}\right) = \frac{1}{.25}\left[3 - .75\right] = 9$$

$$\left(\frac{d^3y}{dx^3}\right) = \frac{1}{.125}\left[.75\right] = 6$$

1½

Q.4 (i) According simpson's $(1/3)^{rd}$ Rule

$$I = \int_{x_0}^{x_0+nh} f(x)dx = \frac{h}{3}\left[(y_0+y_n) + 4(y_1+y_3+\cdots y_{n-1}) + 2(y_2+y_4+\cdots+y_{n-2})\right]$$ $+1\frac{1}{2}$

Here $h = \cdot 1$

$$I = \int_0^1 f(t)dt = \frac{(\cdot 1)}{3}\left[(93+51) + 4(87+55+37+39+53) + 2(68+42+35+48)\right]$$

$$= \left(\frac{\cdot 1}{3}\right)\left[144 + 4(271) + 2(193)\right]$$

$$= \frac{(\cdot 1)}{3}\left[144 + 1084 + 386\right] = \frac{1614}{3}(\cdot 1) = 53\cdot 8$$ $+1\frac{1}{2}$

Q.4 (ii) $\frac{d^2y}{dx^2} = f\left(x, y, \frac{dy}{dx}\right)$, $y(x_0) = y_0$ $\left(\frac{dy}{dx}\right)_{x_0} = y_0'$

Substitute $\frac{dy}{dx} = z$ we get $+5$

$$\frac{dz}{dx} = f(x, y, z)$$

$y(x_0) = y_0$, $z(x_0) = y_0'$.

Euler's Method

$$y_n = y_{n-1} + hf(x_{n-1}, y_{n-1})$$ $+2$

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Q. 4 (iii) Given $f(x,y) = \sqrt{x+y}$, $x_0 = 0$, $y_0 = 1$
$h = .1$

According to Runge kutta method of fourth order

$$K_1 = hf(x_0, y_0)$$

$$K_2 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{K_1}{2}\right)$$

$$K_3 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{K_2}{2}\right)$$

$$K_4 = hf(x_0 + h, y_0 + K_3)$$

$$y_1 = y_0 + K \quad \text{where} \quad K = \frac{K_1 + 2K_2 + 2K_3 + K_4}{6}$$ +2

For first app.

$$K_1 = (.1)(\sqrt{x_0 + y_0}) = (.1)(1) = .1$$

$$K_2 = (.1)\left(\sqrt{.05 + 1.05}\right) = (.1)(1.0488) = \cancel{.1108}\ .1048$$

$$K_3 = (.1)(\sqrt{.05 + 1.055} = (.1)(1.051) = \cancel{.1105}\ .1051$$

$$K_4 = (.1)(\sqrt{.1 + 1.11051}) = (.1)(1.1002) = .11002$$

$$K = \frac{.1 + .2096 + .2210 + .1100}{6} = \frac{.6298}{6}$$

$$= \cancel{.1087}\ .10496$$

$$y_1 = y_0 + K = 1 + .1087 = 1.10496$$ +3

For second app

$x_0 + h = x_1 = .1$, $y_1 = \cancel{1.1087}\ 1.10496$

$K_1 = (.1)\sqrt{.1 + 1.1049} = (.1)(1.072) = .1072$

$K_2 = (.1)\sqrt{.15 + 1.1585)} = (.1)(1.1438) = .1143$

$K_3 = (.1)\sqrt{.15 + (1.10496 + \frac{K_2}{2})} =$

$y_2 = y_1 + K = 1.1049.$

+2

Q.5 (i) when first card is drawn the Probability of being a King is $\frac{4}{52}$

After replacing the card again the Probability of being a King is $\frac{4}{52}$

+1

$\therefore$ Total Probability $= \frac{4}{52} + \frac{4}{52} = \frac{8}{52} = .1538$

+1

Q.5 (ii) Given for Poisson's distribution

$P(r=1) = 2P(r=2)$

$P(x=r) = \frac{e^{-m} \cdot m^r}{r!}$

$m = 0, 1$

+1

$P(r=3)$ for $m=0$ $= 0$

+1

$P(r=3)$ for $m=1$ $= .06131$

+1

Q.5 (iii)

Here $\quad P(X=r) = {}^nC_r\, p^r q^{n-r}$

$n = 6$

$p = \frac{1}{15}, \quad q = 1 - \frac{1}{15} = \frac{14}{15}$ +1

(a) P(Not more than three) = P(0) + P(1) + P(2) + P(3)

$= {}^6C_0\, p^0 q^6 + {}^6C_1\, p\, q^5 + {}^6C_2\, p^2 q^4 + {}^6C_3\, p^3 q^3$

$= 1\cdot\left(\frac{14}{15}\right)^6 + 6\left(\frac{1}{15}\right)\left(\frac{14}{15}\right)^5 + 15\left(\frac{1}{15}\right)^2\left(\frac{14}{15}\right)^4 + 20\left(\frac{1}{15}\right)^3\left(\frac{14}{15}\right)^3$

$= \frac{(14)^6}{(15)^6} + \frac{6\,(14)^5}{(15)^6} + \frac{(15)(14)^4}{(15)^6} + \frac{20\cdot(14)^3}{(15)^6}$

$= \frac{(14)^3\left[20 + 210 + 1176 + 2744\right]}{(15)^6} = (2744)(4150)$ +2

$= \frac{11387600}{11390625} = 0.999$

(b) P(at least three of them will buy)

$= P(3) + P(4) + P(5) + P(6)$

$= {}^6C_3\, p^3 q^3 + {}^6C_4\, p^4 q^2 + {}^6C_5\, p^5 q + {}^6C_6\, p^6$

$= \frac{57905}{(15)^6} = \frac{57905}{11390625}$ +2

$= .00508$

Q.5 (iv) Given that $N = 1000$,

mean $\mu = 14$

$\sigma = 25$

The Standard Normal distribution is

$$Z = \frac{x-\mu}{\sigma}$$ + 1/2

(i) when $x = 12$

then $Z_1 = \frac{x-\mu}{\sigma} = \frac{12-14}{25} = -.08$

when $x = 15$

then $Z_2 = \frac{15-14}{25} = \frac{1}{25} = .04$

$\therefore P(12 < x < 15) = P(-.08 < Z < .04)$

$= P(-.08 < Z < 0) + P(0 < Z < .04)$

$= .0319 + .0160$

$= .0479$

$\therefore$ The required no. of students

$= 1000 \times .0479$

$= 47.9$

≈ 48 1½

(ii) when $x = 18$ then $Z = \frac{18-14}{25} = .16$

$P(x > 18) = P(Z > .16)$

$= 0.5 - P(0 < Z < 1.6)$

$= 0.5 - .0636$

$= .4364$ 1½

The required no. of students $= 1000 \times .4364$
$= 43.64$
$\approx 44.$

(iii) when $x = 8$

then $z = \frac{8-14}{25} = -.24$

$P(x < 8) = P(z < -.24)$
$= P(z > .24)$
$=$ ~~.0948~~
$= .5 - .0948$
$= .4052$

The required no. of students $= 1000 \times .4052$
$= 40.52$
≈ 41 $(1\frac{1}{2})$.

Q.6 (i) $N = 64$ (Total Frequency)

we are given that the theoretical frequencies are in the ratio 9:3:4. Sum of these ratio = 16

$\therefore$ Corresponding theoretical frequencies are

$\frac{9}{16} \times 64 = 36$, $\frac{3}{16} \times 64 = 12$, $\frac{4}{16} \times 64 = 16$

i.e 36, 12, 16 respectively. +2

$\chi^2 = \Sigma \frac{(f_o - f_e)^2}{f_e}$

$= \frac{(34-36)^2}{36} + \frac{(10-12)^2}{12} + \frac{(20-16)^2}{16}$ +1

$$\chi^2 = \frac{4}{36} + \frac{4}{12} + \frac{16}{16} -$$

$$= \cdot 111 + \cdot 333 + 1$$

$$\chi^2 = 1.444$$

d.o.f $(\nu) = 3-1 = 2$

For 2 degree of freedom (χ^2) (from table) $= 5.991$ +2

Since the Calculated value of χ^2 is much less than Tabulated Value.

Q. 6 (ii)

S.NO	x	$x-\bar{x}$	$(x-\bar{x})^2$
1	-4	-4.25	18.0625
2	-2	-2.25	5.0625
3	-2	-2.25	5.0625
4	0	-0.25	.0625
5	2	1.75	3.0625
6	2	1.75	3.0625
7	3	2.75	7.5625
8	3	2.75	7.5625

$\Sigma x = 2$ $\qquad$ $\Sigma (x-\bar{x})^2 = 49.5$ +3

$n = 8 \quad \bar{x} = \frac{\Sigma x}{n} = \frac{2}{8} = \cdot 25$

$$S^2 = \frac{\Sigma (x-\bar{x})^2}{n-1} = 2.659$$ +1

$$t = \frac{\bar{x} - M}{S} = \cdot 27$$ +1

Q.6 (iii)

x	$(x-12)$	$(x-12)^2$	y	$(y-10)$	$(y-10)^2$
9	-3	9	10	0	0
11	-1	1	12	2	4
13	1	1	10	0	0
11	-1	1	14	4	16
15	3	9	9	-1	1
9	-3	9	8	-2	4
12	0	0	10	0	0
14	2	4	–	–	–
94	-2	34	73	3	25

+3

Assumed Mean $\bar{x} = \frac{\Sigma x}{n} = \frac{94}{8} = 11.75$

$\bar{y} = \frac{\Sigma y}{n} = \frac{73}{7} = 10.43 =$

$\sigma_x^2 = 4.1875$

+1

$\sigma_y^2 = 3.388$

$S = 2.13$

$t = \frac{\bar{x} - \bar{y}}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = 1.2$

+1