**Hours: 3 hrs**                                                                                          **Marks: 80**
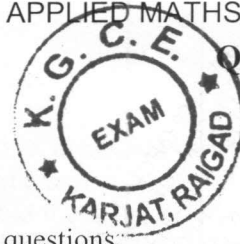
**Note:** 1. Question no. **1** is compulsory.
      2. Attempt any **three** questions out of remaining **five** questions.

**Q.1.[a]** A random discrete variable x has the probability density function given     [5]

| x | -2 | -1 | 0 | 1 | 2 | 3 |
|---|----|----|---|---|---|---|
| P(x) | 0.2 | k | 0.1 | 2k | 0.1 | 2k |

Find (i) k   (ii) E(X)   (iii) V(X).

**[b]** Find smallest positive integer modulo 5, to which $3^2 . 3^3 . 3^4 . 3^{10}$ is congruent.   [5]

**[c]** Given two lines of regression lines $6y = 5x + 90$, $15x = 8y + 130$.   [5]
Find (i) $\bar{x}$, $\bar{y}$ (ii) correlation coefficient r.

**[d]** Show that $G = \{1, -1, i, -i\}$ is a group under usual multiplication of complex number.   [5]

**Q.2.[a]** Show that $111^{333} + 333^{111}$ is divisible by 7.   [6]

**[b]** The following table gives the number of accidents in a city during a week. Find   [6]
whether the accidents are uniformly distributed over a week.

| Day | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Total |
|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| No. of accidents | 13 | 15 | 9 | 11 | 12 | 10 | 14 | 84 |

**[c]** (i) Write the following permutation as the product of disjoint cycles   [8]
    f = (1 3 2 5) (1 4 5) (2 5 1).
(ii) Simplify as sum of product (A+B) (A+B′) (A′+B) (A′+B′).

**Q.3.[a]** Find gcd (2378, 1769) using Euclidean Algorithm. Also find x and y such that   [6]
$2378x + 1769y = \gcd(2378, 1769)$.

**[b]** Give an example of a graph which has   [6]
(i) Eulerian circuit but not a Hamiltonian circuit
(ii) Hamiltonian circuit but not an Eulerian circuit
(iii) Both Hamiltonian circuit and Eulerian circuit

**[c]** Show that $(D_{10}, \leq)$ is a lattice. Draw its Hasse diagram.   [8]

**Q.4.[a]** Calculate the coefficient of correlation between x and y from the   [6]
following data

| x | 23 | 27 | 28 | 29 | 30 | 31 | 33 | 35 | 36 | 39 |
|---|----|----|----|----|----|----|----|----|----|----|
| y | 18 | 22 | 23 | 24 | 25 | 26 | 28 | 29 | 30 | 32 |

**[b]** Let G be a group of all permutations of degree 3 on 3 symbols 1, 2 & 3. Let H ={I, (1   [6]
2)} be a subgroup of G. find all the distinct left cosets of H
in G and hence index of H.

**[c]** (i) The average marks scored by 32 boys is 72 with standard deviation of   [8]
8 while that for 36 girls is 70 with standard deviation of 6. Test at 5%
LOS whether the boys perform better than the girls.
(ii) A random sample of 15 items gives the mean 6.2 and variance 10.24.
Can it be regarded as drawn from a normal population with mean 5.4
at 5% LOS?

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Q.5.[a] Derive mgf of Binomial distribution and hence find its mean and variance. [6]

[b] It was found that the burning life of electric bulbs of a particular brand [6]
was normally distributed with the mean 1200 hrs and the S.D. of 90 hours, Estimate
the number of bulbs in a lot of 2500 bulbs having the burning life: (i) more than 1300
hours (ii) between 1050 and 1400 hours.

[c] (i) Find inverse of $8^{-1}$ (mod 77) using Euler's theorem. [8]

(ii) Find the Jacobi's symbol of $\left(\frac{32}{15}\right)$.

Q.6.[a] Solve $x \equiv 1(\bmod 3)$, $x \equiv 2(\bmod 5)$, $x = 3 \ (\bmod 7)$. [6]

[b] Given L = {1, 2, 4, 5, 10, 20} with divisibility relation. Verify that $(L, \leq)$ is a [6]
distributive but not complimented Lattice.

[c] (i) Draw a complete graph of 5 vertices. [8]
(ii) Give an example of tree. (sketch the tree).

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**ffmail**

## Subject: Correction in QP Code: 37498

From: University of Mumbai<support@muapps.in> on Fri, 11 May 2018 15:43:05

To: <exam_kgce2010@rediffmail.com>

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University of Mumbai

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Correction in T1734A S.E. (SEM. IV) (Choice Based) (INFORMATION TECHNOLOGY) / T10022 **APPLIED MATHEMATICS - IV**     **QP Code: 37498**

**Correction No. 1 :** Q.1. [a] A random discrete variable x has the probability **density** function given should be read as " A random discrete variable x has the probability **mass** function "

**Correction No. 2 :** Q.3. [a]
Find gcd (2378, 1769)........2378x + 1769y = gcd (**2379**, 1769) should be read as "Find gcd (2378, 1769)........2378x + 1769y = gcd (**2378**, 1769) "
This is a humble request to put these corrections on dash board for rest of the colleges.

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