

BRAC University
CSE230 : Discrete Mathematics
Finalterm Examination

Duration : 80 minutes (4:30 pm – 5:50 pm)

Total Marks : 60 Set: A

[Answer all the questions from 1,2,3. Answer any 1 question from 4,5.]

ID:

Name:

Sec:

Q01: [CO4] [15 Points]

- a) Find the coefficient of x^4 in $\left(2x^2 - \frac{1}{3x^3}\right)^7$ [5 points]
- b) How many terms are there in the expansion of $(a - b + c)^{25}$ [3 points]
- c) Find the constant term in the expansion of $\left(9x - \frac{4}{x} + 6\right)^6$ [7 points]

Q02: [CO2] [15 Points]

- a) A passport number consists of two letters (uppercase) followed by seven digits. Both letters and digits are allowed to repeat. Find the number of different passport numbers under this condition. [5 points]
- b) A, B, C, D, E, F, G and H are friends who will be seated in a row.
 - i) In how many ways can they be arranged if A, B and C (they are close friends) must always sit together? [5 points]
 - ii) If “at least” one of the three close friends should not sit next to another close friend, what is the total number of ways to arrange them in a row? [5 points]
[For example, EBAFCDHG, DBFCHAGE are okay, but GHCBAEFD isn't.]

Q03: [CO2] [15 Points]

- a) Out of a total of 60 lecturers, 35 are male. A committee of 8 lecturers needs to be formed. However, no more than five members can be male. How many committees can be formed under these conditions? [6 points]
- b) In how many different ways can 10 be expressed as the sum of four positive integers? [For example, 2+3+3+2, 3+2+3+2, 4+1+4+1 etc.] [4 points]
- c) What is the minimum number of students required in a class to guarantee that at least five students share the same birth month? [5 points]

Q04: [CO3] [15 Points]

- a) If six dice are rolled simultaneously, what is the probability of obtaining at least two 2s?
[6 points]
- b) There are two red balls, four green balls and nine yellow balls in an urn. Four balls are drawn from the urn at the same time. Find the probability of obtaining two green, one red and one yellow ball. [4 points]
- c) If a fair coin is flipped till we get the first tail, what is the probability that we'll have to flip it more than thrice? [5 points]

Or,

Q05: [CO3] [15 Points]

- a) In Brac University, 40% of the students are girls, while the rest are boys. Among the girls, 80% are from Dhaka. And among the boys, 60% are from Dhaka.
- i) If we randomly pick a student, what's the probability that this student isn't from Dhaka?
[5 points]
- ii) Given that the student is from Dhaka, what's the probability that the student is a boy?
[5 points]
- b) Let's consider a coin in your possession. It has two possibilities: it could be a normal fair coin, or it might be a biased one. The probability of either scenario is 50-50. However, if the coin is biased, it's more inclined to land heads – the chance of heads is twice that of tails. Now let's say we toss this coin twice. What's the probability of getting one head and one tail?
[5 points]