# TILAK MAHARASHTRA VIDYAPEETH, PUNE
## BACHELOR OF COMPUTER APPLICATIONS (B.C.A.)
### EXAMINATION : JANUARY - 2023
### SEMESTER - I
#### Sub: Mathematics (BCA-142-20/BCA-CS-142-20)

| Date : 05/01/2023 | Total Marks : 60 | Time: 10.00 am to 12.30 pm |
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*Instructions:*
1. *All questions are compulsory unless and otherwise stated.*
2. *Bold figures to the right of every question are the maximum marks for that question.*
3. *Candidates are advised to attempt questions in order.*
4. *Answers written illegibly are likely to be marked zero.*
5. *Use of scientific calculators, Log tables, Mollier Charts is allowed.*
6. *Draw neat and labeled diagrams wherever necessary.*

**Q.1.** **Solve (Any 4)** **(8)**

1. Express the following in form of $a + ib$

    $(4+5i) - (7-2i)$

2. Find the number of different arrangements that can be made using all the letters of the word "GENIUS"

3. Find the modulus of $(2+i)(3-5i)$

4. If the sum of the roots of a quadratic equation is 5 and the sum of their squares if 27. Find the equation

5. If A and B are two events such that $P(A) = 0.8$, $P(B)=0.6$ and $P(A \cap B) = 0.5$, Find $P(A \cup B)$

6. Draw Venn diagram for  i) $A \cap B$    ii) $A \cup B$

**Q.2.** **Solve (Any 3)** **(9)**

1. For a G.P, $a= 5$, $r=2$, $S_n = 635$, Find n

2. In how many ways can letters of the word MOBILE be arranged? In many of these, the consonants occupy the even places?

3. If $T_n = 3n^2+4n+7$ find $T_4$, $T_9$ and $T_{13}$

4. Check for Tautology: $(p \lor q) \lor (\lor q)$

**Q.3.** **Solve (Any 2)** **(8)**

1. For the sets A = {a, b, c, d}, B = {c, d, e, f}, C = {a, d, f, g}. Verify the following:
    i)   $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
    ii)  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

2. A room has 4 sockets for lamps. From a collection of 15 bulbs of which 8 are defective, 4 are selected at random and put in the sockets. Find the probability that the room is i) dark   ii) lighted

3. Write truth tables for the following:
    i)   $p \lor \sim p$
    ii)  $\sim p \lor \sim q$

**Q.4.** **Solve (Any 3)** (15)

1. Test if the following functions are odd
   a) $f(x) = x^3 + 1$
   b) $f(x) = 3x^2 + 4x$

2. Find 4 numbers in G.P such that their product is 1 and the sum of two middle is 5/2

3. Solve: $6x^2 - 13x - 63 = 0$

4. Find the image of the following function:
   $f(x) = 2x^2 - 3x + 4$, Find f(1), f(0), f(-1), f(-2), f(2)

**Q.5.** **Solve.  (Solve any 2)** (20)

1. Solve the following system of equations by matrix method
   $x + y + z = 6$
   $2x - y + z = 3$
   $-x - y + z = 0$

2. A card is drawn from a pack of 52 playing cards. Find the probability that the card drawn is
   i) a red card
   ii) an ace or a King card
   iii) ace or a spade card
   iv) diamond or a face card
   v) card having number which is a multiple of five

3. Among 100 students, 32 study Mathematics, 20 study Physics, 45 study Biology. 15 study Mathematics and Biology. 7 Study Mathematics and Physics. 10 Study Physics and Biology. 30 do not study any of these subjects. Find the following:

   a) number of students who study all the three subjects
   b) number of students who study Mathematics only
   c) number of students who study Physics only

   Draw the Venn diagram also

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