

**GOA VIDYAPRASARAK MANDAL'S
GOPAL GOVIND POY RAITURCAR COLLEGE OF
COMMERCE AND ECONOMICS , PONDA-GOA
B.C.A. SEMESTER-II EXAMINATION, JUNE 2022
APPLIED MATHEMATICS**

Marks: 60

Duration: 2 Hours

Instructions: i) All questions are compulsory.
ii) Figures to the right indicate full marks.

Q1] A. Fill in the blanks: **(5×1=5)**

- 1) The number of circular permutations in general when clockwise and anticlockwise arrangements are same is _____.
- 2) If the set A has 5 elements then P(A) has _____ elements.
- 3) If $\binom{n}{x} = \binom{n}{y}$ then either $x=y$ or _____.
- 4) The value of $(1+1) \cdot (\overline{0} + \overline{1})$ in Boolean Algebra is _____.
- 5) In binomial expansion, if the index of the binomial is 8 then the number of terms in the expansion are _____.

Q1] B. Answer the following questions: **(5×1=5)**

- 1) If $(x - 2, x + y) = (13, 18)$ then find the values of x and y.
- 2) State "The Pigeonhole Principle".
- 3) Find the total number of ways the word "TOMORROW" can be arranged.
- 4) Give example for each of the Singleton set and Null set.
- 5) Write the following compound statement into symbolic notations:
"Either it is very hot or the AC is not ON".

Q2] Answer the following questions:

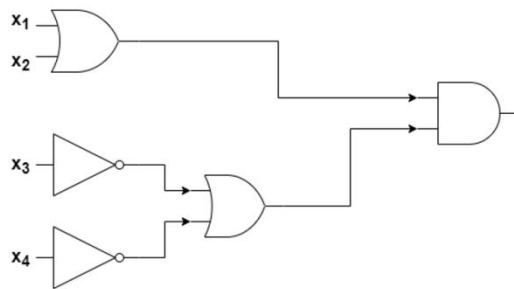
- A. Find the symmetric difference of the two sets A and B if $A = \{0, 1, 2, 3, 5\}$;
 $B = \{-1, 2, 0, -3, 5\}$. **(02)**

B. Show that:

$4-\sqrt{5}$ is an irrational number by indirect proof method. (03)

C. Find the output for a given input from the following circuit by giving proper illustration of the gates.

Inputs: $x_1=1, x_2=1, x_3=0, x_4=1$. (05)



Q3] Answer the following questions:

A. Define Cartesian Product. (02)

B. What is the cardinality of set A if,

$A = \{x \mid 1 \leq x \leq 25 ; x \text{ is divisible by 2 or 5}\}$ (03)

C. State and prove Binomial Theorem for positive integer. (05)

Q4] Answer the following questions:

A. Construct the truth table for $(p \wedge q) \leftrightarrow (p \vee \sim q)$. (02)

B. Determine the number of 3 lettered words with or without meaning, which can be formed out of the letters of the word “NUMBER”.

Where (i) Repetition of the letters is not allowed.

(ii) Repetition is allowed. (03)

C. Let the following statement be true:

- If I sleep then I do not go to college.
- I go to college or I enjoy myself.
- I do not enjoy myself.

Show that the statement “I do not sleep” is a true statement. (05)

Q5] Answer the following questions:

- A. List out different types of function. **(02)**
- B. Perform the binomial expansion for $(x + 2y)^5$ showing Pascal's triangle. **(03)**
- C. Out of 200 students, 60 likes IT, 70 likes Operating System (OS), 80 likes Data Structure (DS), 20 likes IT and OS, 15 likes IT and DS, 10 likes OS and DS and 5 likes all the three subjects.
With the help of Venn diagram find:
- Number of students who like at least one subject.
 - Number of students who like exactly one subject.
 - Number of students who like none of the 3 subjects. **(05)**

Q6] Answer the following questions:

- A. If $A = \{3,4,5\}$, $B = \{5,6\}$, $C = \{5,6,7\}$ then find $(A \times B) \cup (A \times C)$. **(02)**
- B. A bag contains 8 black and 10 red balls. Determine the number of ways in which 4 black and 5 red balls can be selected. **(03)**
- C. Attempt: **(2+3=05)**
- Solve $(x + \bar{y}) \cdot (\bar{x} + \bar{y}) \cdot (\bar{x} + y)$ using the identities of Boolean Algebra. **(02)**
 - If $X = \{11, 12, 13, 14\}$; $A = \{11, 12\}$ and $B = \{12, 13, 14\}$ then verify DeMorgan's Law. **(03)**

*****ALL THE BEST*****