

Total Pages : 4

KN-262

B.C.A. (Part-I) Examination, 2022

**THEORETICAL FOUNDATION OF
COMPUTER SCIENCE**

(Calculus and Statistical Analysis)

[Paper : Second]

Time Allowed : Three Hours

Maximum Marks : 50

Minimum Passing Marks : 17

Note : Attempt **all five** questions. **one** question from each unit is **compulsory**. All questions carry **equal** marks.

UNIT-I

1. If

$$f(x) = \begin{cases} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2}, & x \neq 2 \\ k, & x = 2 \end{cases}$$

KN-262/1000

(1)

[P.T.O.]

is continuous at $x = 2$, find the value k . [10]

OR

Find the value of $\lim_{x \rightarrow \frac{\pi}{2}} (\sec x - \tan x)$.

UNIT-II

2. Find $\frac{dy}{dx}$, when $\sqrt{x^2 + y^2} = \log(x^2 - y^2)$. [10]

OR

Find $\frac{dy}{dx}$, where $y = x^2 + (\sin x)^{\log x}$.

UNIT-III

3. Find the equation of tangent and normal to the curve

$$x^{2/3} + y^{2/3} = 2 \text{ at } (1,1). \quad [10]$$

OR

Find the points of maxima and minima of a function

$$y = 2x^3 - 3x^2 + 6.$$

UNIT-IV

4. A problem in Statistics is given to the three students A, B and C whose chances of solving it are $\frac{1}{2}, \frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved if all of them try independently ? [10]

OR

For two events A and B prove that :

$$\begin{aligned}P(A \cap B) &= P(A) \cdot P\left(\frac{B}{A}\right), P(A) > 0 \\&= P(B) \cdot P\left(\frac{A}{B}\right), P(B) > 0\end{aligned}$$

Where $P\left(\frac{B}{A}\right)$ represents the conditional probability of occurrence of B when the event A has already happened and $P\left(\frac{A}{B}\right)$ is the conditional probability of happening of A when B has already happened.

UNIT-V

5. Fit a parabola of second degree to the following data :[10]

$x :$	0	1	2	3	4
$y :$	1	1.8	1.3	2.5	6.3

OR

Calculate the correlation coefficient for the following heights (in inches) of fathers (x) and their sons (y) :

$x :$	65	66	67	67	68	69	70	72
$y :$	67	68	65	68	72	72	69	71

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