

CAIIS-N 118 A-18
BCA. IIInd Semester Degree Examination
Computer Science
(Foundation Course in Mathematics For Computing - II)
Paper : 2.4
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

Section A : Answer all questions.

Section - B & Section - C Answer any four questions.

Section - A

1. Answer the following : (10×2=20)
- a) If $A = \{2, 3, 4, 5\}$, $B = \{3, 4, 6, 8\}$ find A-B.
 - b) Define finite set.
 - c) Define equivalence relation.
 - d) If $f : R \rightarrow R$ defined by $f(x) = x^2$ and $g(x) = 1-x$ find $fog(x)$.
 - e) What is logic gate?
 - f) Define semigroup.
 - g) State Gauss Divergence theorem.
 - h) Define a tree.
 - i) What is vector? Give one example.
 - j) Define Tautology.

Section - B

Answer any four questions. (4×5=20)

2. Let $A = \{1, 2, 3, 4\}$ and $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 3), (3, 3), (4, 4)\}$ be a relation on A. Verify R for equivalence relation.

3. Prove that if $f : A \rightarrow B$ is a bijection, then $(f^{-1})^{-1} = f$.
4. Write the truth table for $(p \times q) \rightarrow r$.
5. Prove that $1 + 3 + 5 + \dots + (2n + 1) = n^2$ using mathematical induction.
6. Prove that intersection of two subgroups of group G is also a subgroup of G.
7. Explain the Kongis berg's Bridge problem.

Section - C

Answer any four questions. **(4×10=40)**

8. a) Find the inverse of $\begin{bmatrix} 4 & 5 \\ 6 & 7 \end{bmatrix}$ **(5)**
- b) Define symmetric and skew - symmetric matrices with examples. **(5)**
9. a) Explain Pigeonhole principle. **(5)**
- b) Explain compound prepositions. **(5)**
10. a) Negate "All odd numbers are not prime numbers and some prime numbers are even". **(4)**
- b) Find the Directional Derivative of the function $\phi(x, y, z) = xy^2 + yz^3$ at $(2, -1, 1)$ in direction of $2\mathbf{i} + \mathbf{j} + 2\mathbf{k}$. **(6)**
11. Verify stoke's theorem for the function $f = y^2\mathbf{i} + xy\mathbf{j} - xz\mathbf{k}$, where s is hemisphere $x^2 + y^2 + z^2 = a^2, z \geq 0$. **(10)**
12. Show that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$ where $r = x^2 + y^2 + z^2$. **(10)**
13. a) Prove that if G is not connected then \overline{G} is connected. **(5)**
- b) If $f = xy\hat{\mathbf{i}} + yz\hat{\mathbf{j}} + zx\hat{\mathbf{k}}$ show that $\nabla^2 f = 0$. **(5)**

