B.A.DEGREE (CBCSS) EXAMINATION, APRIL 2015
SECOND SEMESTER – COMPLEMENTARY COURSE FOR SOCIOLOGY
ECO2SL – SYMBOLIC LOGIC

Time: Three Hours   **Maximum: 80 marks**

Part A
Answer *all* questions. Each question carries 1 mark.

1. A proposition is a statement which is either true or _____.

    A) Doubtful   B) False   C) None   D) Ambiguous.

2. "If and only if there is oxygen then there will be combustion", is an example of
    _____Proposition.

    A) Conjunctive   B) Disjunctive   C) Bi-conditional   D) Conditional.

3. $p \, Ñ \, q$ is True when:

    A) p is true and q is false   B) p is true and q is true
    C) p is false and q is true   D) q is false and p is true

4. $p \supset q$ is false when _____.

    A) p is true and q is false   B) p is false and q is true   C) both are true   D) both are false

5. A statement form that has only true substitution instances is called _____.

    A) Tautology   B) Contradictory   C) Contingent   D) Specific Statement form

6. A professor is either good in teaching or good in research is _____ proposition.

    a) Conjunctive   b) Implicative   c) Alternative   d) Negative

7. Name the rule of inference for this equation: p • p / ∴p

    A) Material implication   B) Commutation   C) Association   D) Simplification

8. Either Rama is tall or Gopal is short is a _____ proposition.

9. In symbolic logic letters p, q, r etc. are called _____.

10. If a candidate contest for election then the candidate can win, is _____proposition.

10 x 1 = 10 Marks

Part B (Short Answer Questions)
Answer any *eight* of the following questions in a paragraph each (not exceeding 100 words)
Each question carries 2 marks

11. Define truth table.

12. Write the DeMorgan's rule.

13. Define a compound statement.

14. What are logical variables?

15. Write the three basic functions of logic.

16. State the advantages of symbolization.

17. State the difference between a proposition and an argument.

18. Define a tautology.

19. Bring out the difference between a statement and a statement form.

20. Give the symbolic form of the statement "Both FedEx and UPS deliver goods overnight."

21. Define formal proof of validity.

22. Define Truth Function.

8 x 2 = 16 marks

Part C (Short Essays)
Answer any *Six* of the following questions in one and half pages each (not exceeding 150 words)
Each question carries 4 marks

23. Bring out the differences between truth, validity and soundness of statement/arguments.

24. Symbolize the following statement and using truth table determine whether the statement is a tautology, contradiction or contingent: (letters to use are P,H,P & E)
      "If a person is happy he will work happily, and if a person is educated he will be efficient."

25. Translate the given argument into symbolic form and determine the validity/invalidity by Constructing a truth table:
    "If there are dried - up river beds on Mars, then water once flowed on the Martian surface.
    There are dried – up river beds on Mars. Therefore, water once flowed on Martian surface."

26. Check the validity of the following symbolized argument using truth table.

$$S \supset T$$
$$S \supset {\sim}T$$
$$\underline{{\sim}T \supset \ S}$$
$$S \vee {\sim}T$$

27. Use indirect or short cut truth table method to determine the validity of this argument:
$${\sim}A \supset (B \vee C) \, / \, {\sim}B \, // \, C \supset A$$

28. Using the rules of inference construct a formal proof of validity for the following argument:

$$
\begin{array}{ll}
\text{i)} & P_v (R \supset S) \\
\text{ii)} & \sim C \supset (S \supset M) \\
\text{iii)} & P \supset C \\
\text{iv)} & \sim C \ / \ \therefore R \supset M .
\end{array}
$$

29. Bring out the difference between statement and statement form.

30. State the advantages of natural deductions over truth table method.

31. Write the truth - table for all truth – functional connectives.

6 x 4 = 24 Marks

Part D (Long Essays)
Answer any *two* of the following questions not exceeding four pages each.
Each question carries 15 marks

32. Write a note on Natural deductions in propositional logic. State the eight rule of Replacement.

33 Using the Rules of Inference derive the conclusion of the following symbolised arguments:

a)	i)	$A \supset B$	b)	i)	$A \supset (B \supset C)$
	ii)	$\sim A \supset (C \lor D)$		ii)	$Q \supset (C \supset E)$
	iii)	$\sim B$		iii)	A
	iv)	$\sim C \ / \ D$		iv)	$Q \ / \ (B \supset E)$

c)	i)	$\sim J$
	ii)	$J \lor K$
	iii)	$K \supset L \ / \ L$

34. Draw the truth-tables for the following:

a. Conjunction
b. Material implication
c. Disjunction
d. Negation

2x 15 = 30 Marks