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B.TECH.
THEORY EXAMINATION (SEM–VI) 2016-17
COMPLEXITY THEORY

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

Explain the following : **(10×2=20)**

a) Turning Machine
b) Parallel computation
c) Diagonalisation
d) Uncomputable function
e) NP-Complete problem
f) Counting problems
g) Interactive proof
h) Approximability and inapproximability
i) Adleman's theorem
j) Fooling set

SECTION-B

Attempt any five of the following : **(10×5=50)**

a) What do you mean by complexity classes? Discuss the relationship among the complexity classes.
b) Explain the general steps in establishing NP-completeness proof of a given problem.
c) Write the randomized version of Quick sort algorithm.
d) State the circuit satisfiability problem. Prove the circuit satisfiability problem belongs to the class NP.
e) Prove that Single and Multi-tape Turning Machines are equivalent.
f) State Godel's incompleteness theorem. Also give one example.
g) State Rice theorem and its application in domain of complexity.
h) Write the steps of randomized version of quick sort algorithm with its complexity

SECTION-C

Attempt any two of the following: **(15×2=30)**

3 Explain the following class of problems:

i) BPP
ii) RP
iii) CORP

Prove that:

i) if A is a problem in P, then the complement $\bar{A}$ of A is also in P.
ii) if the complement of an NP-complete problem is in NP, then NP = CO – NP.

Write short notes on the following:

i) Quantum Computation
ii) Communication complexity
iii) Parallel Computation

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