Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2018

Course: Theory of Automata & Computation **Semester: IV**
Program: B.Tech.-CS+ Cyber Law
Time: 03 hrs. **Max. Marks: 100**

Instructions: Attempt all questions. Make proper assumptions if needed.

SECTION A

S. No.		Marks	CO
Q1	What is ε-closure(q)? Explain with an example.	**4**	**CO1**
Q2	Describe as simple as possible the language corresponding to each of the following regular expressions. a) 0*1(0*10*1)*0* b) (1+01)*(0+01)*	**4**	**CO1**
Q3	Consider the following grammar and remove the ε-production from the following grammar. S → ABAC A → Aa/ ε B → bB/ ε C → c	**4**	**CO2**
Q4	Define and compare the Deterministic-PDA and Non- Deterministic-PDA? Explain with example.	**4**	**CO3**
Q5	Discuss properties of recursive languages and recursive enumerable languages.	**4**	**CO4**

SECTION B

Q6	Construct a Moore machine which calculates the residue mod-4 for each string treated as binary integers.	**10**	**CO1**
Q7	Design a CFG for the language L = $\{a^n b^m : n!=m\}$. And convert the obtained CFG into Chomsky Normal Form.	**10**	**CO2**
Q8	Which one of the following grammars generate the language L = $\{a^i b^j : i != j\}$? i) S → AC/CB, C → aCb / a /b, A → aA/ ε , B → Bb / ε ii) S → aS / Sb / a /b iii) S → AC/CB, C → aCb /ε , A → aA/ ε , B → Bb / ε iv) S → AC/CB, C → aCb / ε , A → aA/ a , B → Bb / b In the correct grammar above, what is the length of the derivation to generate the string $a^n b^m$ with n !=m?	**10**	**CO2/CO3**
Q9	Describe various types of Turing machine and discuss halting problem of Turing machine. **Or,**	**10**	**CO5/C01/CO2**

	Construct the Finite Automata corresponding to the following regular grammar:- S $\rightarrow$0S / 1A / 1 A $\rightarrow$ 0A / 1A / 0 / 1		
	SECTION-C		
Q10	Design a Turing Machine to recognize a language L= $\{0^n1^n2^n$, n>=1}. Simulate Turing Machine for the string "001122"	**20**	**CO5**
Q11	Design a PDA for the language L, where L= {wcw^R : w ε (a+b)* and w^R is reverse of word w}. **Or,** Write short notes on the following :- a) Church's Turing Hypothesis b) Regular Language c)Pumping Lemma for regular language d)Properties of context free language	**20**	**CO3/CO1/CO2/CO5**