SET A

Name: **Enrolment No:**	UPES

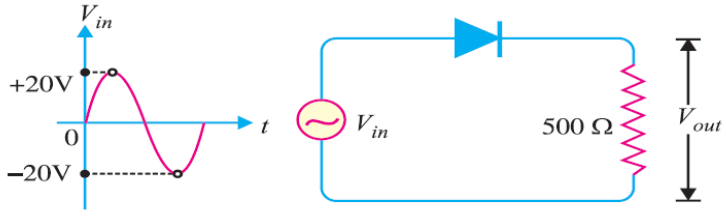
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

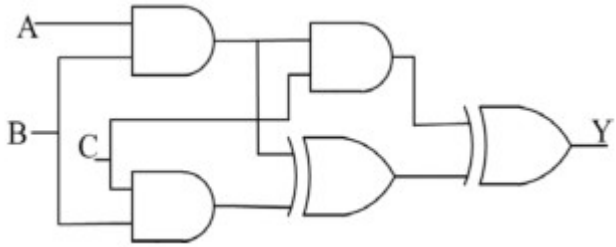
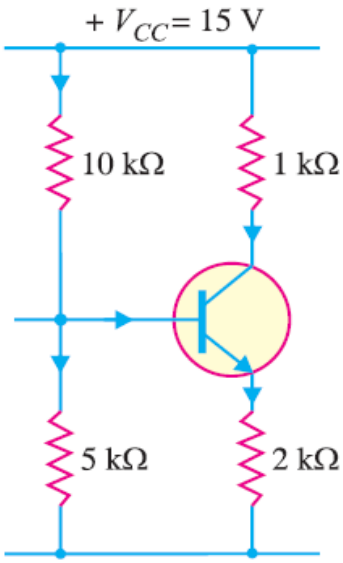
End Semester Examination, December 2018

Programme Name: B.Tech. CHE R&P, APE spe GS, APE spe US, ME **Semester : I**
Course Name : Basic Electronics Engg. **Time : 03 hrs**
Course Code : ECEG 1002 **Max. Marks : 100**
Nos. of page(s) : 2

Instructions: 1) Mention Roll No at the appropriate place in the question paper. 2) Answers should be brief and concise. 3) Assume any missing data

SECTION A (20 marks)
All question of section A are compulsory

S. No.		Marks	CO
Q 1	Enumerate the characteristics of a Zener diode. How a Zener diode is different from a crystal diode?	**4**	**CO1**
Q 2	Explain the physical structure of NPN transistor. Also label various majority charge carriers for the terminals.	**4**	**CO1**
Q 3	Explain the significance of digital logic. Why digital logic is preferred in design of computers?	**4**	**CO1**
Q 4	Explain the hexadecimal number system. Enumerate with the help of an example.	**4**	**CO1**
Q 5	What is meant by the term universal gate? Which gates are considered as universal gates? Explain with the help of an example.	**4**	**CO1**
	SECTION B (40 marks)		
Q 6	An a.c. voltage of peak value 20V is connected in series with a silicon diode and load resistance of 500Ω. If the forward resistance of the diode is 10Ω, find: (i) Peak current through diode, and (ii) Peak output voltage. Also calculate the values if the diode is assumed to be an ideal diode.  Fig 1. Q5 – Diode circuit	**10**	**CO2**
Q 7	Design a circuit for emitter bias based transistor configuration. Derive the expression for I_C, V_{CE}.	**10**	**CO2**
Q 8	Convert the following numbers into corresponding number system (3 marks each) A. $(60)_{10}=(?)_{16}$	**10**	**CO2**

	B. $(001010110010100)_2=(?)_{16}$ C. $(171)_8=(?)_2$ D. $(1A4)_{16}=(?)_2$		
Q 9	Simplify the following Boolean expressions: A. $Y=(A+B+C).(A+B)$ B. $Y=AB+ABC+AB\acute{C}$	**10**	**CO2**
	SECTION-C (25 marks)		
Q 10	A. Derive the expression for current amplification factor (α) and base current amplification factor(β). In a transistor configuration, $I_B=68\mu A$, $I_E=30mA$, and $\beta=440$. Determine the α rating the transistor. Also calculate the collector current. B. Develop the simplified Boolean expression for the following digital circuit: 	**10+10**	**CO3**
Q 11	A. For the following amplifier determine the operating point.  B. Develop a full adder using two half adders. Support your circuit with the help of a truth table.	**10+10**	**CO3**

SET B

Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

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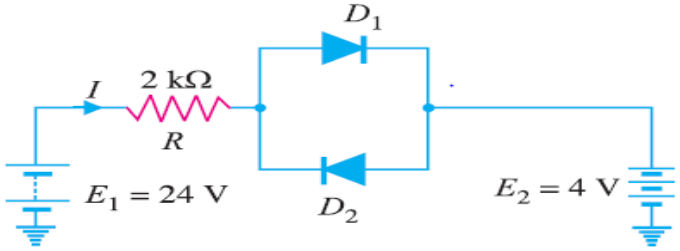
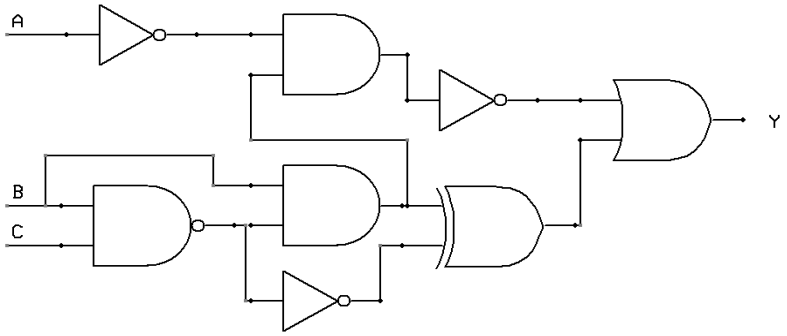
SECTION A (20 marks)
All question of section A are compulsory

S. No.		Marks	CO
Q 1	Enumerate the characteristics of a crystal diode. Does a crystal diode obeys ohm's law?	4	CO1
Q 2	Explain the physical structure of PNP transistor. Also label various majority charge carriers for the terminals.	4	CO1
Q 3	Explain the significance of amplification. Which electronic devices are commonly used as amplifiers?	4	CO1
Q 4	Explain the binary number system. Enumerate with the help of an example.	4	CO1
Q 5	Why NAND gate is considered as a universal gate? Explain with the help of an example.	4	CO1
	SECTION B (40 marks)		
Q 6	Determine the current I in the circuit shown in figure 1. Assume the diodes to be of silicon and forward resistance of the diodes to be zero.  Fig1. Q5 – Diode circuit	10	CO2
Q 7	Design a circuit for voltage divider based transistor configuration. Derive the expression for I_C, V_{CE}.	10	CO2
Q 8	Simplify the following Boolean expressions: A. $Y = 1 + A(B.\acute{C} + BC + \acute{B}.\acute{C}) + A\acute{B}C + AC$ B. $Y = (A + \acute{B} + \acute{C}) + (B + \acute{C})$	10	CO2
Q 9	Convert the following numbers into corresponding number system (3 marks each) A. $(40)_{10} = (?)_{16}$	10	CO2

	B. $(000111101100)_2=(?)_{16}$ C. $(152)_8=(?)_2$ D. $(C4)_{16}=(?)_2$		
SECTION-C (40 marks)			
Q 10	A. For a transistor derive the expression for α and β. In a transistor configuration, $I_B=18\mu A$, $I_E=25mA$, and $\alpha=0.096$. Determine the β rating the transistor. Also calculate the collector current. B. Develop the simplified Boolean expression for the following digital circuit: 	**10+10**	**CO3**
Q 11	A. Design an emitter bias amplifier such to satisfy the following requirements: $+V_{CC}=15V, -V_{EE}=15V, R_B=100\,K\Omega, R_E=10\,K\Omega, R_C=4.7\,K\Omega, \beta=110$ Also calculate the operating point for the amplifier. B. Develop a full adder using two half adders. Support your circuit with the help of a truth table.	**10+10**	**CO3**