

**2 0 1 4**

**( 4th Semester )**

**ELECTRONICS**

**FOURTH PAPER**

**( Pulse Switching Circuit )**

**( PART : A—OBJECTIVE )**

**( Marks : 20 )**

**SECTION—A**

**( Marks : 5 )**

*Each question carries 1 mark*

**Answer all questions**

Put a Tick ( ✓ ) mark against the correct answer in the brackets provided :

**1. The number  $100101_2$  is equivalent to octal**

**(a) 54      (    )**

**(b) 45      (    )**

**(c) 37      (    )**

**(d) 25      (    )**

2. In Colpitts' oscillator, feedback is obtained

- (a) by magnetic induction ( )
- (b) by a ticker coil ( )
- (c) from collector of transistor ( )
- (d) from the centre of split capacitor ( )

3. The frequency of oscillator of an astable multivibrator depends on

- (a) value of transistor  $\beta$  ( )
- (b) value of collector load resistor ( )
- (c) RC value of the circuit ( )
- (d) width of input pulse ( )

**4. Negative feedback**

- (a) increases the gain of the amplifier ( )
- (b) decreases the gain of the amplifier ( )
- (c) increases the gain and bandwidth of the amplifier ( )
- (d) decreases the gain and increases the bandwidth of the amplifier ( )

**5. The RC phase shift produced per section of an RC oscillator is**

- (a)  $60^\circ$  ( )
- (b)  $120^\circ$  ( )
- (c)  $180^\circ$  ( )
- (d)  $360^\circ$  ( )

( 4 )

SECTION—B

( Marks : 15 )

*Each question carries 3 marks*

Answer *any* **five** questions

1. What is meant by frequency stability of an oscillator?

2. With logic circuit, obtain the truth table for NAND, NOR and XOR gates.

3. What is closed loop gain? What are the advantages of negative feedback?

4. What is the basic difference among three types of multivibrator?

5. A quartz crystal has the following equivalent parameters :

$L = 3\text{H}$ ,  $C = 0.05\text{ pF}$ ,  $R = 2\text{k } \Omega$  and  $C_s = 10\text{ pF}$ . Calculate (a) the series resonant frequency and (b) the parallel resonant frequency.



6. What are the uses of multivibrators?

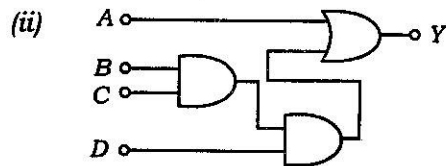
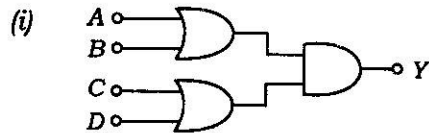
( 10 )

7. What is return difference? Calculate the gain of a negative feedback amplifier with an internal gain  $A = 100$  and feedback factor  $\beta = \frac{1}{20}$ .

8. Write the circuit diagram of Colpitts' oscillator. Also write the frequency of oscillation in Colpitts' oscillator.

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5. (a) Write the Boolean equation for the following figures : 2+2=4



- (b) With block diagram, explain the working of digital voltmeter. 3
- Or

- (a) What would be the output signal if two input binary signals given by  $A = 100101$  and  $B = 110110$  are applied to (i) OR gate, (ii) NAND gate? 2+2=4

- (b) Show that 3
- $$(A + B)(A + \bar{B})(\bar{A} + C) = AC$$

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2014

( 4th Semester )

ELECTRONICS

FOURTH PAPER

( Pulse Switching Circuit )

Full Marks : 55

Time : 2 hours

( PART : B—DESCRIPTIVE )

( Marks : 35 )

*The figures in the margin indicate full marks for the questions*

Answer **all** questions

1. (a) Show that the voltage gain with negative feedback in an oscillator is  $\frac{A}{1 + \beta A}$ . 4
- (b) Explain how the output impedance of an amplifier decreases due to negative feedback. 3

( 2 )

Or

- (a) What are the various types of negative feedback? Explain how negative feedback increases stability of amplifier.  $1+3=4$
- (b) In negative feedback amplifier, the open-loop gain of the amplifier is 100. A negative feedback of 4% is employed around this amplifier. What will be the change in the input signal levels, if the output is to be 1 volt (i) with negative feedback, (ii) without negative feedback? 3
2. (a) Derive the frequency of oscillation and condition for sustained oscillation of Hartley oscillator. 4
- (b) For a tunnel diode,  $L = 0.01 \mu\text{H}$  and  $C = 5 \text{ pF}$ . If the negative resistance region of the diode characteristic has a negative slope  $r_d = 100\Omega$  and the bulk resistance of the device  $R_B = 50\Omega$ , does the circuit produce oscillation? 3

Or

- (a) Differentiate between damped and undamped oscillations. How will you get undamped oscillations from a tank circuit? Explain.  $2+2=4$
- (b) With a neat diagram, explain the action of tuned collector oscillator. 3

( 3 )

3. (a) What is piezoelectric effect? Explain series and parallel resonant frequency from crystal oscillator equivalent circuit.  $2+3=5$

- (b) What is oscillator? Write two main classifications of oscillator. 2

Or

- (a) Write the operation of Wien bridge oscillator. What are its advantages and disadvantages?  $3+2=5$

- (b) What is tank circuit? 2

4. (a) With neat diagram, explain the working of emitter-coupled binary oscillator (Schmitt trigger). Write the uses of Schmitt trigger.  $3+2=5$

- (b) Write the uses of monostable multivibrator. 2

Or

- (a) With a neat sketch, explain the working of monostable multivibrator. 5

- (b) Show that the switching time (time period) of an astable multivibrator is  $1.38$  times the product of  $R$  and  $C$ . 2