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Paper Code : ESC 301/ESC301/PC-ROB301 Analog and Digital Electronics

UPID : 003442

Time Allotted : 3 Hours   *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following :   [1 x 10 = 10]

   (I) The functional difference between an S-R flip-flop and a J-K flip-flop is that
   a) J-K flip-flop is faster than S-R flip-flop
   b) J-K flip-flop has a feedback path
   c) J-K flip-flop accepts both inputs equals to 1
   d) J-K flip-flop does not require external clock

   (II) Which of the following represents range of frequency measured by ADC?
   a) Bandwidth
   b) Threshold frequency
   c) Peak frequency
   d) None of the mentioned

   (III) What is the maximum efficiency of a class B power amplifier?
   a) 50% b) 90% c) 25% d) 78.5%

   (IV) How many Half adders required to add two 8 bit numbers?
   (a) 8 (b) 15 (c) 10 (d) 2

   (V) The invalid state for S-R latch occurs when S and R are _____.
   a) both high
   b) both low
   c) S = high, R = low
   d) S = low, R = high

   (VI) Which A/D converter is considered to be simplest, fastest and most expensive? a) Servo converter b) Counter type ADC c) Flash type ADC d) none of the above.

   (VII) Where does the Q point lie for class B amplifier?
   a) Active
   b) Cut off
   c) Saturation
   d) Between saturation and active

   (VIII) Which of the following combinations cannot be combined into K-map groups?
   a) Overlapping combinations b) Diagonal corners c) Corners in the same column d) Corners in the same row

   (IX) A D flip-flop can be used as
   a) divider circuit   b) differentiator c) delay switch d) toggle circuit

   (X) The fastest logic gate family is
   a) CMOS
   b) ECL
   c) TTL
   d) RTL.

   (XI) For a Class B amplifier, the utilized load power is 300W and the DC power is 500W, find efficiency.
   a) 30%
   b) 60%
   c) 90%
   d) 100%

   (XII) An example of weighted code is
   a) 2421 b) GRAY c) XS3 d) All of these

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. What is Multiplexer ? Design 4:1 multiplexer using basic logic gates. [5]

3. Distinguish between latch and flip-flop. Write down the difference between combinational and sequential [5]
   logic circuits.

4. What is the function of comparator in analog to digital converter and write down the applications [5]
   of analog to digital converter.

5. What do you mean by race around condition and how we can overcome it? [5]

6. Calculate the frequency of 4 bit ripple counter if the time period of last flip-flop is 64 microsecond. [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. What do you mean by power amplifier ? What are the different types of power amplifier? Explain the [15]
   operation of Class B push-pull amplifier? What is crossover distortion? https://www.makaut.com

8. Explain the working of a R-2R Ladder type DAC with a neat circuit diagram. [15]

9. Draw and explain Master and Slave JK flip-flop . [15]

10. Design a MOD 8 asynchronous UP/ DOWN counter using JK flip-flop. [15]

11. Why does the dual slope ADC provide excellent noise rejection of AC signal whose periods are integral [15]
    multiples of the integration time? Find the resolution of a 12 bit DAC converter. What are the advantages
    and disadvantages of R-2R ladder DAC.

*** END OF PAPER ***