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RR-0613

First Year B. Sc. Examination

March / April – 2010

Electronics : Paper - II

(Network Analysis of Synthesis)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ F. Y. B. Sc.

Name of the Subject :

☛ Electronics - 2

☛ Subject Code No. : 0 6 1 3 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Figures on the right indicate marks.

(3) All symbols and abbreviations have their usual meaning.

(4) Use of non-programmable calculator is allowed.

(5) Assume data if necessary.

1 Answer in brief : **14**

(i) What are linear and bilateral impedances?

(ii) Find the Laplace transform of unit step function.

(iii) What is the average of the sinusoidal function for one complete cycle?

(iv) Define : "Resonance."

(v) State the Norton's theorem.

(vi) What do you mean by quality factor Q?

(vii) What is an electronic filter?

2 (a) State and explain the Thevenin's theorem. **8**

(b) Find the inverse Laplace transform for the following function : $F(s)=\frac{s+5}{s^2+6s+8}$ **6**

OR

2 (a) Discuss fully step current response of an R-L-C circuit. What is the time constant of R-L-C circuit? Draw the graphical representation of above response. **10**

(b) In a series R-L-C circuit damping ratio is 20 and natural frequency of oscillation is 100 Hz. Find the time constant of the circuit. **4**

3 (a) Define Fourier Series. Deduce the constant coefficients as a_0, a_1, b_1, a_n and b_n. **8**

(b) State and explain Ohm's law, Kirchoff's voltage law and Kirchoff's current law. **6**

OR

3 (a) Evaluate instantaneous power. **8**

$$P(t) = \frac{Vm\ Im}{2} \cos\theta - \frac{Vm\ Im}{2} \cos(2\omega t - \theta)$$

(b) A voltage $v(t) = 170 \sin(377 + 10°)$ is applied to a circuit. It causes a steady state current to flow, which is described by $i(t) = 14.4 \sin(377 - 20°)$. Determine the power factor and average power delivered to the circuit. **6**

4 (a) Define series resonance and prove that for an *R-L-C* series circuit the Q factor is : **10**

$$Q = \frac{1}{R}\sqrt{\frac{L}{C}}$$

(b) A series resonance circuit uses an inductor of $10\,\mu H$ and if the resonance frequency is 1 kHz then find the value of the capacitor used in the circuit. **2**

(c) Distinguish between series and parallel resonance. **2**

OR

4 (a) Explain the constant-K low pass filter and find the expression for cut-off frequency. **10**

(b) Name the various type of filter you have studied. **2**

(c) Discuss the applications of filter circuits. **2**

5 Write short notes : (any **two**) **14**

(a) Maximum power transfer theorem

(b) Tellegen's theorem

(c) N^{th} order Laplace transform

(d) Balanced three phase system

(e) One Port and two port network.