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SB-3515

M. Sc. (Part - II) Examination

March / April – 2011

Physics : Paper - II

(SPL : Electronics - I)

(Electronic Communication & Measurement & Instrumentations)

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 :

☛ **M. Sc. (Part - 2)**

Name of the Subject :

☛ **Physics : Paper - 2**

☛ Subject Code No. : **3 5 1 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Answers to the two sections must be written in separate answer books.

(3) Symbols have their usual meaning.

(4) Simple calculators are allowed to use.

(5) Figures to right indicate full marks of the question.

SECTION - I

1 (a) Name different types of noise. Discuss any one in detail. **4**

(b) State the super heterodyne principle. **3**

(c) Explain the principle of Dopplar radar. **4**

2 (a) Draw circuit and explain working of an envelope demodulator. **7**

(b) Define resolution of ADC. Calculate the quantization error of a 16 bit ADC having input voltage range 0 to 2 volts. **5**

OR

2 (a) Discuss second order PLL alongwith its analysis. **5**

(b) In FM system the frequency deviation constant is K=1.5 kHz/Volt. A sinusoidal modulating signal of 10V and 3 kHz is applied. Calculate (i) the peak frequency deviation and (ii) the modulation index. **7**

3 (a) Prove that if the input to a stable linear time-invarient is a wide-sense stationary random process, then the output of the filter is also a wide sense stationary random process. **7**

(b) Determine the PSD and the mean square of a random process. **5**

$x(t) = A \cos (Wct + \theta)$

When θ is a random variable distributed over $(0, 2\pi)$.

OR

(a) What is power spectral density? Find the power spectral density and the power of the following singal **7**

$v(t) = B \cos (Wot + \theta)$

(b) A RADAR is to have a maximum range of 50 km. What is the maximum allowable pulse repetition frequency for unambiguous reception? **5**

SECTION - II

4 (a) Explain Chi-square test using one example. **3**

(b) Explain : **4**

(i) Stimulated emission an

(ii) Population inversion.

(c) Draw a block diagram of basic A/D converter. **4**

5 (a) What is a transducer? **7**

Explain : (i) LVDT,

(ii) Hall effect transducer

State their applications.

(b) From the following data obtain Y as a linear function of X using the method of least squares : **5**

X	2.4	4.0	4.8	7.1	7.1	7.4	6.5
Y	2.0	3.2	6.8	8.0	10.4	12.8	14.8

OR

5 (a) What is strain gage? Describe the and working of a resistance strain gage. State its applications. **7**

(b) What are the origins of noise in experiments? For flow of minority charge carriers through p-n junction diode. Show that the rms shot noise current is given by **5**

$$I_{dc} = \sqrt{2}\ q, I_0 \triangle f$$

6 (a) Explain filtering methods of correction in the measuring system for spurious inputs giving suitable examples. **7**

(b) Explain the applications of optical fibers in communications. **5**

OR

6 (a) List various types of lasers. Describe any two soild state lasers in detail. **7**

(b) A resistance strain gage with R=120 ohm and F= 2.0 is placed in an equal arm bridge in which all resistances are equal to 120 ohm. The power voltage is 4V. Calculate the detector current in microampere per microinch of strain. The galvanometer resistance is 100 ohm. **5**