International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunication Engineering

Final Examination

Program: **B.sc (Engg.)**
Course Code:**ETE-3645**
Total Marks: **50**

Semester: **Autumn-2022**
Course Title: **Electronic Measurement & Instrumentation**
Time: **2 Hours 30 Minutes**

(i) Answer all the questions. The figures in the right-hand margin indicate full marks.
(ii) Course Outcomes (COs) and Bloom's Levels are mentioned in additional Columns.

Course Outcomes (COs) of the Questions	
CLO1	Apply Theoretical Knowledge, techniques and relevant tools to the analysis, design and testing of modern engineering issues.
CLO2	Understand the performance characteristics and co-relation of different physical parameter with measuring instruments.
CLO3	Analyze and interpret data after performing experiments and determine various types of errors in measurements.

Bloom's Levels of the Questions						
Letter Symbols	**R**	**U**	**Ap**	**An**	**E**	**C**
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

Q1.	**a)**	Define an electronic multimeter & Ohm meter.	**CLO1**	**R**	**3**
	b)	A Sawtooth voltage has a peak value of 50v & a time period of 3.0 . Calculate the error when measuring the voltage with an average reading Voltmeter calibrated in term of RMS value of a sinusoidal wave.	**CLO1**	**E**	**4**
	c)	What is DVM ? Explain the types of DVM.	**CLO2**	**U**	**3**
Q2.	**a)**	Provide a block diagram illustrating the key components of a DSO.	**CLO2**	**Ap**	**3**
	b)	Explain the working of a Q meter and the role of resonance in its operation.	**CLO1**	**U**	**3**
	c)	Show the block diagram of a dual trace oscilloscope and its functionalities.	**CLO3**	**An**	**4**
		OR			
Q2.	**a)**	Describe the basic components of a Cathode Ray Tube and their functions.	**CLO2**	**Ap**	**3**
	b)	A CRT has an anode voltage of 2000v and parallel deflecting plates 2 cm long and 5mm apart. The screen is 30cm from the centre of the plates. Find the input voltage required to deflect the beam through 3cm. The input voltage is applied to the deflecting plates through amplifiers having an overall gain of 100.	**CLO2**	**An**	**4**

	c)	Explain the *loading effects of rectifier instruments.*	*CLO3*	*U*	*3*

Part B

Q3.	**a)**	Describe the different types of optical sources and the advantages of fiber optic sensors.	**CLO3**	**Ap**	**6**
	b)	Calculate the incident power when the effective area of a photodiode is 0.2 × 10^(-4) $m^2$and the irradiance is 250 W/ m^2. Additionally, the load resistance is 10 KΩ and the capacitance of the diode is 2 pF. Determine the cut-off frequency.	**CLO3**	**E**	**4**
Q4.	**a)**	Write the operation of a Swept Frequency Generator and provide a block diagram of its components.	**CLO3**	**Ap**	**3**
	b)	Describe the engineering applications of a wave analyzers.	**CLO1**	**Ap**	**3**
	C)	Explain the term "total harmonic distortion" Describe the functioning of a total harmonic distortion meter.	**CLO3**	**An**	**4**
		OR			
Q4.	**a)**	Describe the construction and working of a vaccuum type of photo cell.	**CLO3**	**Ap**	**6**
	b)	A photovoltaic cell exhibits an open circuit voltage of 0.33 V when subjected to an illuminance of 10 W/m^2. When a load of 100 Ω is connected to the cell, a current of 2.2 mA is delivered at that illuminance. Determine the internal resistance of the cell and the open circuit voltage for an illuminance of 25 W/m^2. Assume that the calibration voltage remains constant for both cases.	**CLO3**	**C**	**4**
Q5.	**a)**	Explain the block diagram of an optical power meter used for measuring optical power levels.	**CLO1**	**Ap**	**5**
	b)	Describe a computer-controlled system used for measuring the performance of an audio amplifier. Include a block diagram illustrating the components involved in the measurement process.	**CLO2**	**E**	**3**
	c)	Explain stabilized light source of a signal generator.	**CLO3**	**R**	**2**