TTL771 **ELECTRONICS AND CONTROLS FOR TEXTILE INDUSTRY** **Major**

Time: 90 min 36 Marks

NAME: **ENTRY #**

Note: Answer each question in the space provided below it only, and **RETURN** the sheets (1-4).

Q 1-10 carry 2 marks each, Q 11 carries 10 marks (5x2), and Q 12-13 carry 3 marks each.

ROUGH WORK ONLY ON THIS PAGE

1. (a) What is meant by a 'half-bridge strain gauge circuit'?

(b) How is a load cell related to strain gauge?

2. (a) Using a *capacitance measurement based tester for yarn evenness*, speed of _____ m/min are possible at present.

(b) 'Moisture content of the yarn material should remain constant otherwise it affects the capacitance measurement'. Is the statement True or False? Justify.

3. Name and describe any one technique/technology to clear yarn fault occurring due to 'white polypropylene'.

4. (a) For intelligent/electronic textile application , _____senses patient posture and activity level.

(b) What is a *transceiver* ?

5. Explain the functioning of a *Line Scan CCD camera*.

6. Name any four applications using electro-spun fibres.

7. (a) Radio-Frequency Dryers for textile applications work in the frequency range of 13-40 **(Hz/KHz/MHz/GHz).**

(b) The _____ is a material property that determines how well the material absorbs the RF energy.

(c) 'RF dried products are hot and dry on the inside and cooler and wetter on the outside': True/False? Justify.

8. Explain the function (giving circuit diagram) and use of an Opto-Isolator.

9. (a) Autolovellers can be classified as _____, _____ and _____.

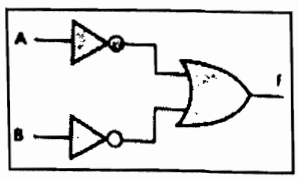
(b) (b) *FAN* in smart textiles stands for _____.

10. Smart/interactive textiles (SIT) are materials and structures that sense and *react* to environmental conditions or stimuli. Classify SIT based on manner of *reaction*.

11. (a) A microcomputer uses a microprocessor for its CPU (control and processing unit). Apart from this, the microcomputer primarily has more _____ and _____ .

(b) The number of flip-flops needed to _____ (multiply/divide) the input frequency by 32 is ____.

(c) _____is the fastest logic family, and _____ family consumes the lowest power?



(d) The single gate equivalent to the given gate circuit is _____.

(e) The 555 Integrated circuit is for _____, and 741 is a/an _____.

12. A logic circuit for subtracting two bits is referred to as a *Half-Subtractor*. Realise a half-subtractor using digital logic gates, showing the steps followed for this realisation.

13. In the given digital circuit the Data inputs are **A, B** and **C**. Depending on the **Instruction** contained in the 4-bits of the Instruction Register (IR), outputs are available as **CY** and **F**. Thus for the given **instruction** (i.e. IR content): **1011**, the corresponding **CY** and **F** are as shown.

    If the contents of the Instruction Register (IR) are <u>now changed</u> to **1010**, interpret the logic **F**. (Ignore CY).