Indian Institute of Technology Dharwad
भारतीय प्रौद्योगिकी संस्थान धारवाड़

EE101 Spring 2021 Exam 1

Instructor: Dr. Abhijit Kshirsagar
(username@domain.academic)

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Full Name (all caps): _____

Roll Number / ID (all caps): _____

Instructions:

1. Modify this text block to add all the instructions.

2. The front page is designed to have just the instructions - questions begin on the next page.

3. Put away all bags, books, notebooks, cellphones, laptops, tablets, smartwatches, etc.

4. Only ONE A4 or letter sized crib sheet for formulae or notes is allowed.

5. Scientific/programmable calculators are allowed.

6. Write your answers clearly and legibly in the space provided.

7. Points will be awarded for correct formulae, intermediate steps and working.

8. Use the provided paper for rough work if needed.

9. If any data are missing, make reasonable assumptions and state the same with justification.

10. This exam booklet has a total of 8 questions on 7 pages.

11. The exam consists of three sections worth 25 points, 25 points and 50 points respectively.

12. Points for each question are indicated in square brackets in the right margin.

13. For multiple choice questions, select the **best option** or **all correct answers**, as appropriate, and write your response in the space below each question, e.g. **A** or **A,B,D**

14. For fill-in-the-blank questions write the answer in the corresponding blank space.

Section 1: 4 Points

1. This a multiple-choice question with a single answer. Which among the following is the largest integer?   [1]

    A. 1

    B. 2

    C. 3

    D. 4

1. _____

2. This is a True / False Question. Is two greater than one?:   [1]

    A. True

    B. False

2. _____

3. Multiple-choice questions can have more than one correct option also. Identify all the positive number from the following: [1]

    A. 1

    B. -1

    C. 2

    D. -2

3. _____

4. This is a fill-the-blanks question. Complete the following series: One, three, _____, seven, _____, eleven.   [1]
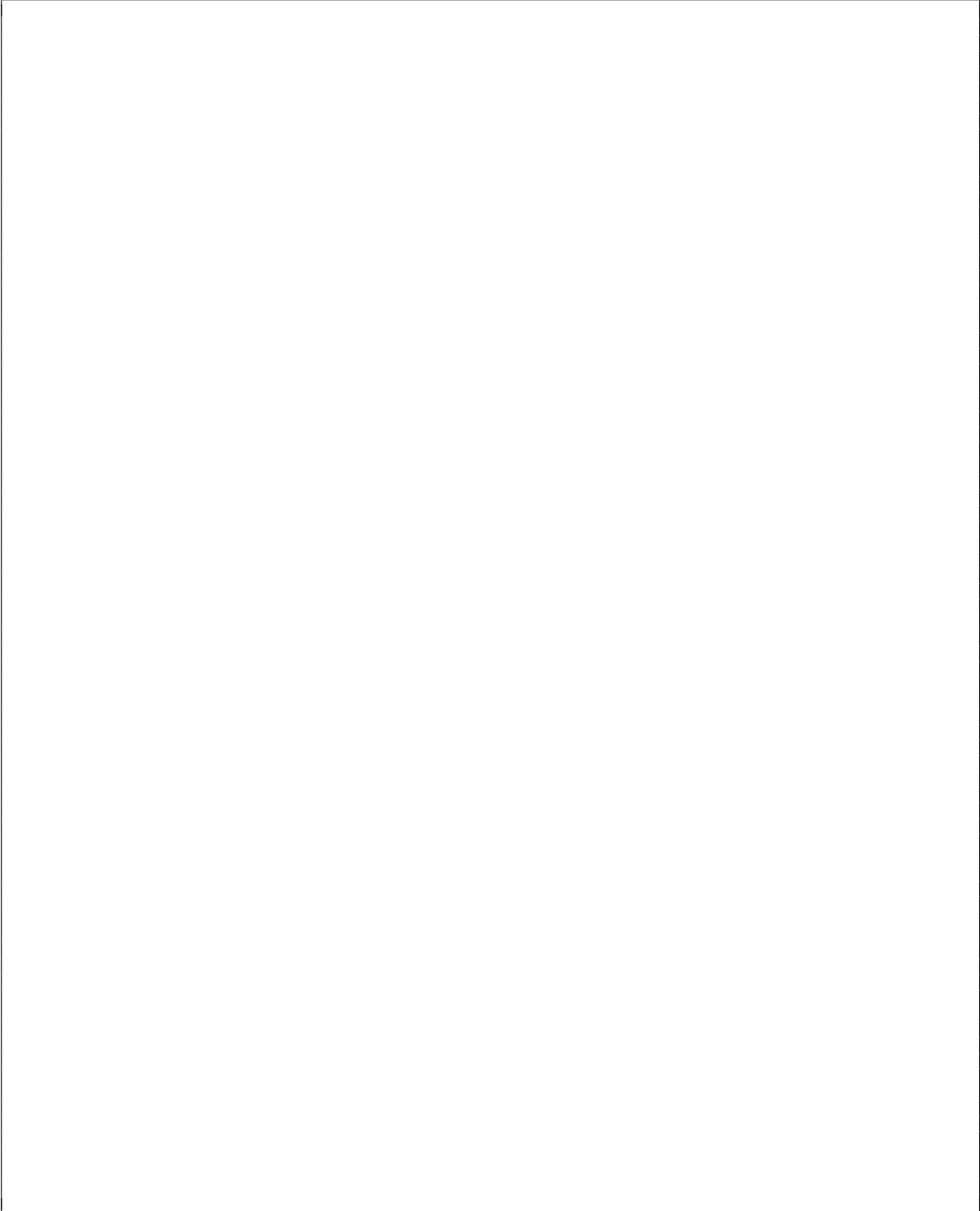
Section 2: 1 Points

5. These are some examples of numerical problems. A 1kW load runs continuously for one day. Find the total energy drawn in kJ.   [1]

Section 3: 40 Points

6. These are some "long form" questions. A PV Panel is found to have a maximum power point of 34.1V [10] and 9.83A when tested at STC ($1kW/m^2$), and has a stated efficiency of 19.6%. Estimate the active area of this panel (i.e. the area of semiconductor that light falls on) in m^2.

7. This is a question that requres a graph / plot as the response. The graph can be generated in T_EX. [10]
   A PV Panel has a maximum power point of 34.1V and 9.83A when tested at STC (standard testing conditions) and a fill factor of 83.8%. The open circuit voltage is found to be 40V. Compute the short circuit current for this panel and then sketch the VI curve, and label the maximum power point.
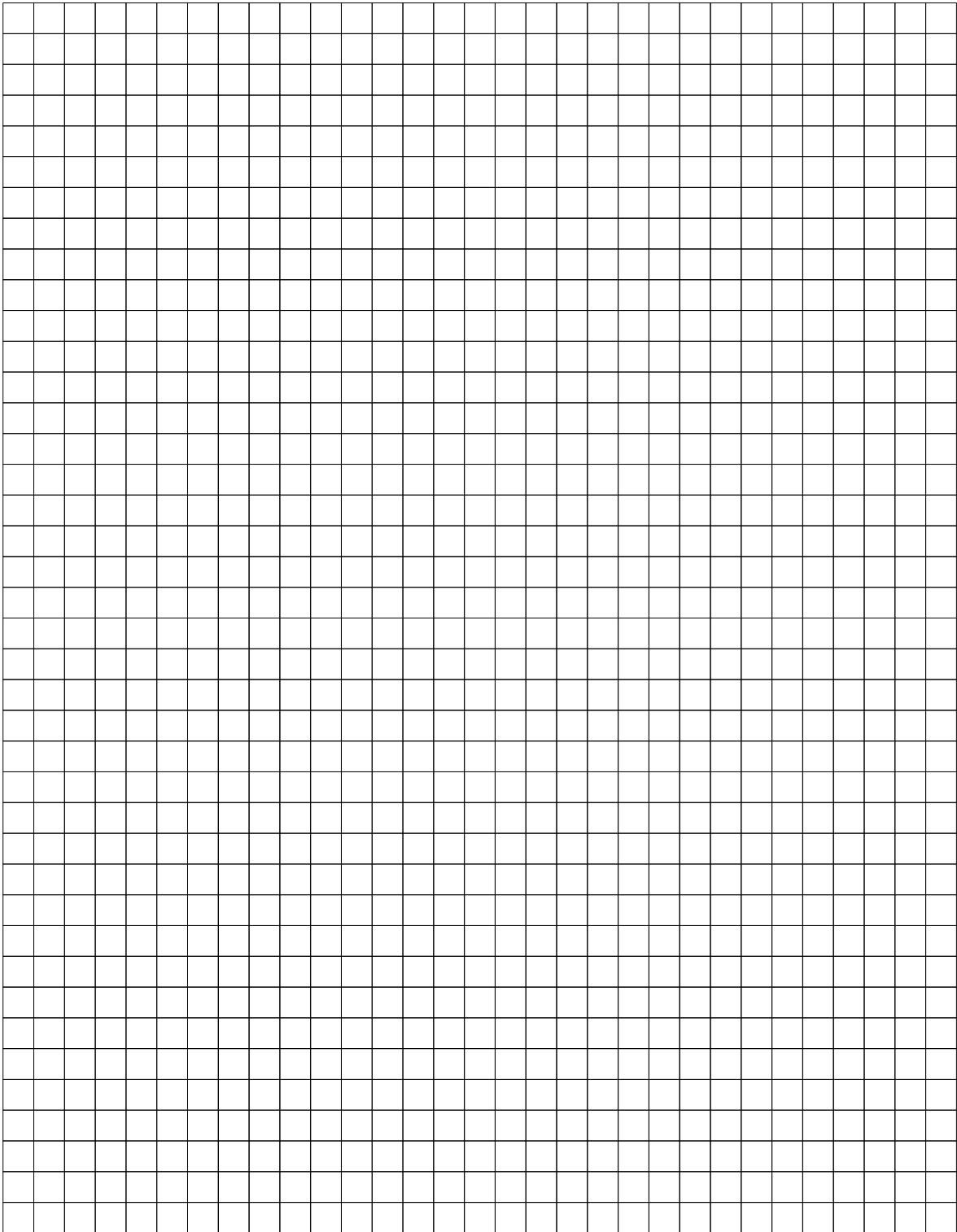
8. This is an example of a complex, multi-part question with multiple types of sub-parts. A user wants to connect an inductive load (Z) with a rating of 10kW and a power factor of 0.5 to the utility supply, as shown in the figure below. The supply voltage is $v_g(t) = 170 \sin(\omega t + 0°)$, with a frequency of 60Hz.
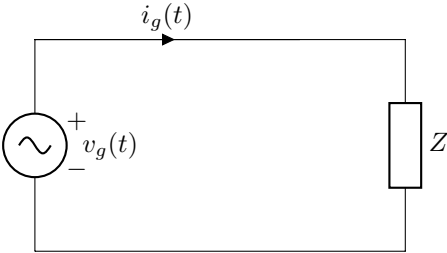
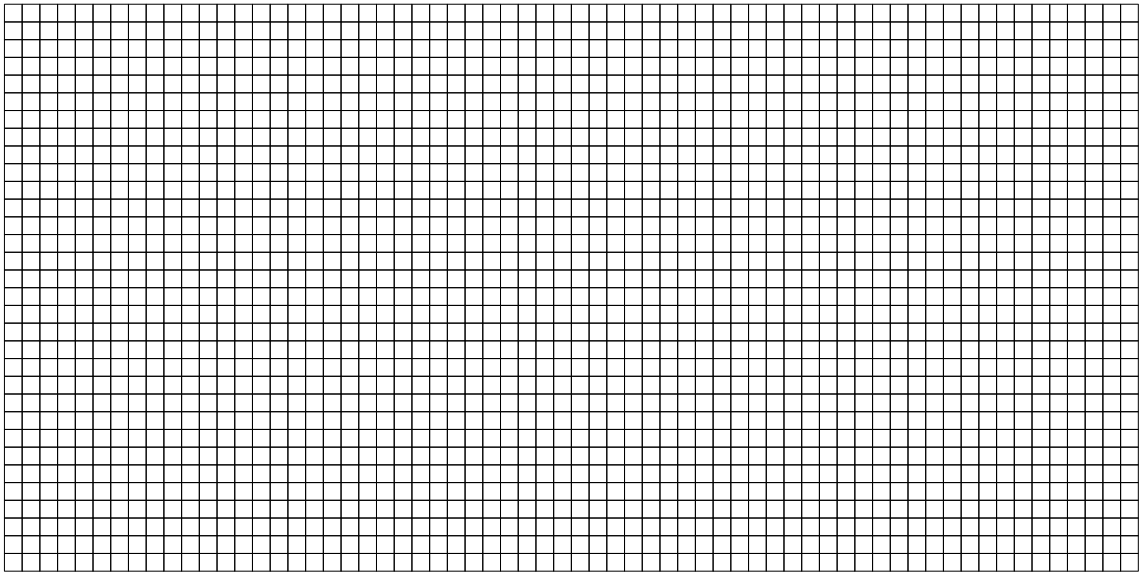(a) Calculate values of P, Q and S (with the appropriate units): [5]

P = _____

Q = _____

S = _____

(b) Draw the power triangle for this load. You can change the spacing of the grid too: [5]

(c) Calculate the net impedance now. [5]

(d) What is the power factor seen by the grid after the capacitor is installed? [5]

Do not write on this page.

Section 1

Question:	1	2	3
Points:	1	1	1
Score:			

Question:	4		Total
Points:	1		4
Score:			

Section 2

Question:	5	Total
Points:	1	1
Score:		

Section 3

Question:	6	7	8	Total
Points:	10	10	20	40
Score:				