

**BIRLA INSTITUTE OF TECHNOLOGY MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: IMSC/MSC
BRANCH: PHYSICS

SEMESTER : VIII/II
SESSION : SP/2023

SUBJECT: PH410 ELECTRONIC DEVICES & CIRCUITS

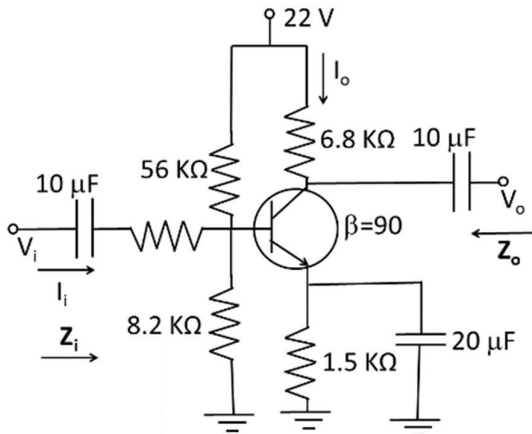
TIME: 3 HOURS

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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|---|-----|----|-----|
| Q.1(a) Write a short note on Varactor diode and explain its tuning ratio and figure of merit? | [5] | 1 | 2 |
| Q.1(b) Derive the I-V characteristics of a solar cell and the expression for maximum output power? | [5] | 1 | 2,4 |
| Q.2(a) Explain the process of Optical lithography and its limitations? | [5] | 2 | 2,3 |
| Q.2(b) Write a short note on process of crystal growth and wafer preparation? | [5] | 2 | 2 |
| Q.3(a) Mathematically establish relation between gain-bandwidth product for network with feedback factor β and without feedback? | [5] | 3 | 4,5 |
| Q.3(b) For the network in the figure below determine: (a) r_e (b) Z_i (c) Z_o ($r_o = \infty \Omega$) (d) A_v ($r_o = \infty \Omega$) (e) The parameters of parts (b) through (d) if $r_o = 1/h_{oe} = 50 \text{ k}\Omega$ and compare results. | [5] | 3 | 5,6 |



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|---|-----|-----|-----|
| Q.4(a) Derive an expression for the frequency response of the Op-amp and discuss the method of dominant-pole compensation? | [5] | 4 | 3,4 |
| Q.4(b) Describe the frequency response of an ideal differentiator? How the limitation of an ideal differentiator can be overcome in a practical differentiator? | [5] | 4,5 | 4,5 |
| Q.5(a) Explain the construction of a 555 timer circuit and its application as astable multivibrator? | [5] | 5 | 3 |
| Q.5(b) Discuss the working of R-2R Ladder Digital to Analog convertor? How it is better than binary weighted type resistor D/A convertor? | [5] | 5 | 3 |