Reg. No. : ....

Name : ....

Ph.D. ENTRANCE EXAMINATION, NOVEMBER 2022

FACULTY OF ENGINEERING AND TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING

Time : 3 Hours　　　　　　　　　　　　　　　　　　　　Max. Marks : 100

Instructions :

　　1) *Answer **any ten** questions each from* Section ***A*** *and **B**.*
　　2) *Each question carries **5** marks.*
　　3) *No additional Answer sheets will be provided.*
　　4) *Candidates should clearly indicate the section, Question number in the answer booklet.*

Section – A

Research Methodology

I.　Answer any **ten** questions. All Questions carry equal marks.

1.　What are the difference between discovery, invention and research?

2.　What is the Importance of Research Methodology?

3.　Describe the characteristics of quantitative research problems.

4.　What are the stages of the research process?

5.　Describe the characteristics of quantitative research problems.

6.　Explain the importance of literature review.

7.　List out some tools to create citations easily and effectively.

8. What are different types of reasoning?

9. Describe mathematical modelling.

10. Define the term Hypothesis and explain its importance.

11. What is sampling? Briefly explain different methods of sampling?

12. Describe the process of data cleaning.

13. Outline some of univariate statistical methods.

14. What is the one-sample t-test?

15. Discuss about ethics in research.

(10 × 5 = 50 Marks)

Section – B

Electronics and Communication Engineering

II. Answer any **ten** questions. All Questions carry equal marks.

1. What is ideality factor of a diode? Write down the diode equation and identify each symbol used.

2. In the circuit shown, the breakdown voltage and the maximum current of the Zener diode are 20 V and 60 mA. respectively. The values of R_1 and R_L are 200 Ω and 1 kΩ. respectively. What is the range of Vi that will maintain the Zener diode in the 'on'state?
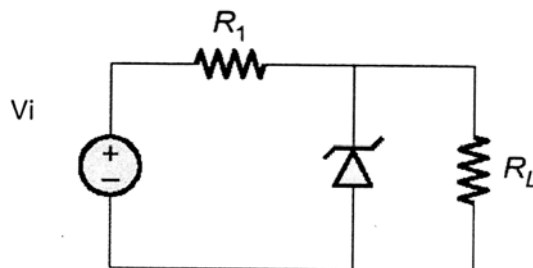
3. Draw the structure of a CMOS transistor. What are the advantages of CMOS?

4. The figure below shows a multiplexer where S1 and S0 are the select lines, I_0 to I_3 are the input data lines, EN is the enable line. Find the Boolean function F(P, Q, R) of the output F.
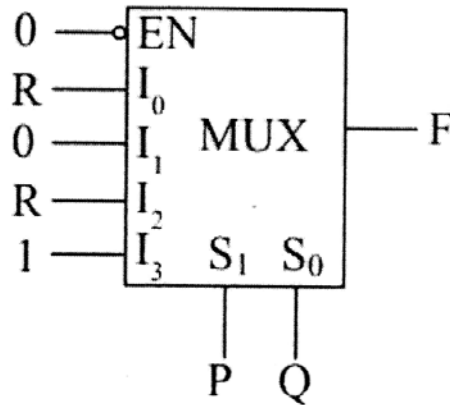
5. Distinguish between Harvard and Von Neumann architecture?

6. Explain QAM. Illustrate the constellation diagram of 8QAM.

7. What is a matched filter receiver? Comment on its impulse response?

8. Show that the response of a Gaussian random process applied to a linear system is a Gaussian random process.

9. State Parseval's power theorem? Explain its mathematical form.

10. Write down Maxwell's equations, and explain its importance.

11. A voice signal $m(t)$ is in the frequency range 5 kHz to 15 kHz. The signal is amplitude modulated to generate an AM signal $f(t) = A(1 + m(t))$ cos $2\pi f_c$, t where $f_c = 600$ kHz. The AM signal $f(t)$ is sampled at 1.2 times the Nyquist frequency, and then quantized each sample using a 256-level quantizer. Find the bit rate of the resulting data stream

12. Find the transfer function $Y(s)/X(s)$ of the system shown in figure.
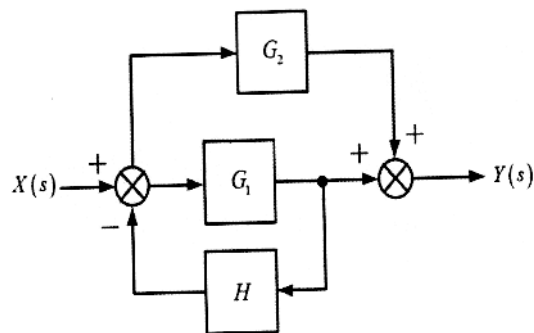
13. Define controllability and observability?

14. Explain quantum efficiency and responsivity of a photodetector.

15. Differentiate between EIRP and ERP of an antenna?

(10 × 5 = 50 Marks)

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