DTL LaTeX Assignment

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Contents

1 Mathematics paper

1.1 Details

MA-19002 Linear Algebra

Program: S.Y.B.Tech
Examination: End Semester Examination
Date: 30/11/2022

Academic Year: 2022-23
Maximum marks: 60
Time: 10:00 am - 1:00 pm
Student MIS Number:

1.2 Instructions

1. Write your MIS number on Question Paper.
2. Writing anything on question paper is not allowed.
3. Mobile phones and programmable calculators are strictly prohibited.
4. Exchange/Sharing of stationery, calculator,etc is not allowed.
5. Figures to the right indicate the course outcomes and maximum marks.
6. **Answers to all subparts should be written together.**

Question [I]

Attempt **any two**:

1. Find the vector parallel to the line of intersection of the two planes:

$$2x - y + z = 1;$$
$$3x + y + z = 2$$

[CO1][2]

2. Find eigenvalues and corresponding eigenvectors of

$$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$$

Hence, find an orthogonal basis for R^2 [CO3][3]

Question [II]

Attempt the following:

1. Find the rank of matrix

$$\begin{bmatrix} 8 & 6 & 4 & 1 & 3 \\ 2 & 1 & -7 & 4 & 1 \\ 1 & 1 & -1 & 2 & 1 \\ 1 & -1 & 2 & 0 & 0 \end{bmatrix}$$

OR

2. Test the convergence of improper integral

$$\int_{\pi}^{\infty} \frac{2 + \cos x}{x}\, dx$$

[CO3][3]

3. Assume that the given series is convergent and find its limit.

$$\sqrt{1}, \sqrt{1 + \sqrt{1}}, \sqrt{1 + \sqrt{1 + \sqrt{1}}}, ...$$

[CO4][2]

P.T.O.

Question [III]

Discuss the convergence of **any one** of the series: [CO5][2]

$$1 - \frac{1}{3} + \frac{1}{2} - \frac{1}{6} + \frac{1}{3} - \frac{1}{9} + \frac{1}{4} - \frac{1}{12} + \cdots$$

OR

$$\sum (-1)^n b_n \; if \; b_n = \begin{cases} \frac{1}{n^2} & \text{if } n \text{ is odd} \\ \frac{1}{2^n} & \text{if } n \text{ is even} \end{cases}$$

Question [IV]

1. Use Lagrange's mean value theorem to prove the inequality

$$|tan^{-1}\alpha - tan^{-1}\beta| \leq |\alpha - \beta|$$

for all real numbers α and β. [CO2][2]

2. Evaluate **any two** of the following: (**write the answer in the simplest form**) [CO3][$2 \times 2.5 = 5$]

(a)$\int_0^\infty \sqrt[4]{x} e^{-\sqrt{x}}\, dx$ (b)$\int_0^{\frac{\pi}{2}} \left(\sqrt{\tan x} + \sqrt{\sec x}\right)\, dx$ (c)$\int_0^1 \sqrt{x^3}\sqrt{1-\sqrt{x}}\, dx$

ALL THE BEST!

2 Tables

2.1 Using LaTeX

Marks	Number of students		Total
	Males	Females	
30-40	8	16	14
40-50	16	10	26
50-60	14	16	30
60-70	12	8	20
70-80	6	4	10
Total	56	44	100

Table 1: This is a table.

2.2 Using pgfplotstable

DATA	PERCENTAGE	SR NO
0.1	10	1
0.2	20	2
0.3	30	3
0.4	40	4
0.5	50	5
0.6	60	6

Table 2: Autogenerated table from .csv file.

3 Basic Electrical Engineering Paper

3.1 Using *graphicx* environment

Q.1.a Calculate the current through the 6 Ω resistance shown in 1, using Norton's theorem.

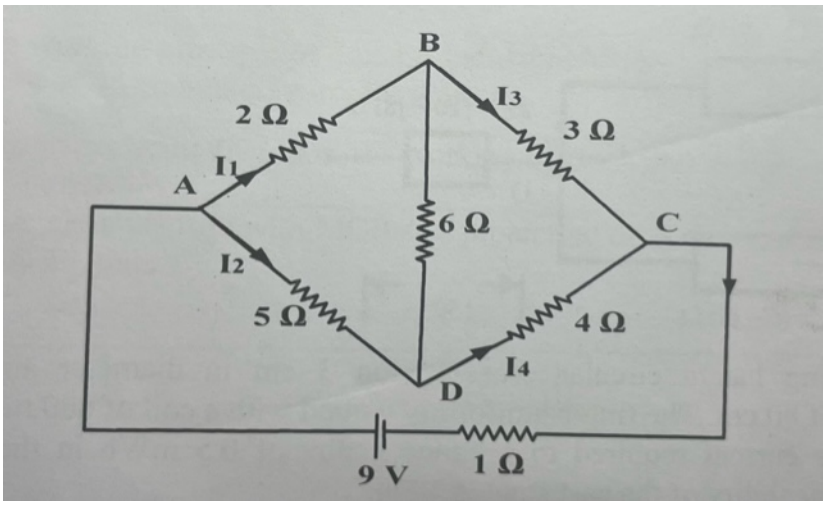

Figure 1: 1A

Q.1.b Find V_1, V_2 and V_3 for the circuit shown in 2 by Nodal Analysis.

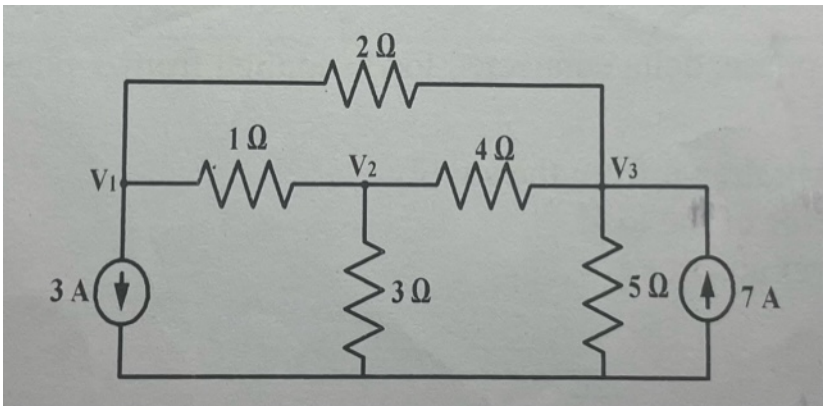

Figure 2: 1B

4 IEEE Format Paper

Artificial Intelligence (AI) has grown dramatically and becomes more and more institutionalized in the 21st Century. In this era of interdisciplinary science, of computer science, cybernetics, automation, mathematical logic, and linguistics [1], questions have been raised about the specific concept of AI [2]. In 1950, Turing [3] presented the famous "Turing Test" which defined of the concept of "Machine Intelligence". On this background, the origins of AI can be traced to the workshop held on the campus of Dartmouth College in 1965 [4], in which McCarthy persuaded participants to accept the concept of "Artificial Intelligence". It is likewise the beginning of the first "Golden age" of AI.Given below in 3 shows components of AI. In simple

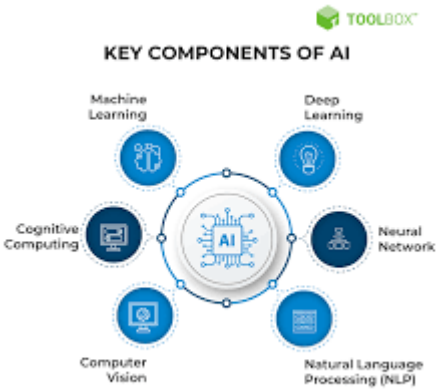

Figure 3: Components of AI

terms, AI aims to extend and augment the capacity and efficiency of mankind in tasks of remaking nature and governing the society through intelligent machines, with the final goal of realizing a society where people and machines coexist harmoniously together [5]. Due to the historical development, AI has been utilized into several major subjects including computer vision, natural language processing, the science of cognition and reasoning, robotics, game theory, and machine learning since the 1980s [6],[7]. These subjects developed independently of each other. However, these disciplines basically had already abandoned the logical reasoning and heuristic search-based methods which were proposed 30 years ago as shown in 4.

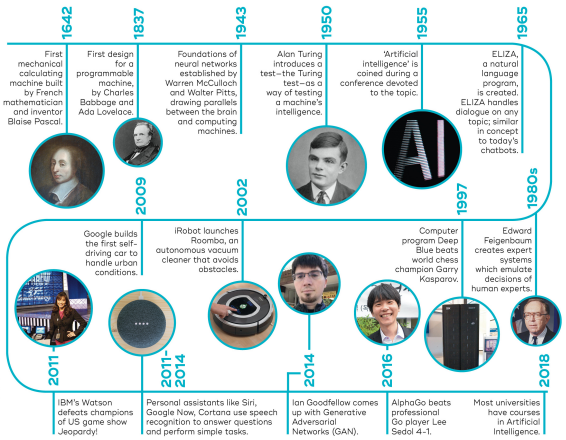

Figure 4: History of AI

References

[1] S. M. Metev and V. P. Veiko, Laser Assisted Microtechnology, 2nd ed., R. M. Osgood, Jr., Ed. Berlin, Germany: Springer-Verlag, 1998.

[2] J. Breckling, Ed., The Analysis of Directional Time Series: Applications to Wind Speed and Direction, ser. Lecture Notes in Statistics. Berlin, Germany: Springer, 1989, vol. 61

[3] S. Zhang, C. Zhu, J. K. O. Sin, and P. K. T. Mok, "A novel ultrathin elevated channel low-temperature poly-Si TFT," IEEE Electron Device Lett., vol. 20, pp. 569–571, Nov. 1999.

[4] M. Wegmuller, J. P. von der Weid, P. Oberson, and N. Gisin, "High resolution fiber distributed measurements with coherent OFDR," in Proc. ECOC'00, 2000, paper 11.3.4, p. 109.

[5] R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digitalto-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.

[6] (2002) The IEEE website.

[7] M. Shell. (2002)IEEEtran homepage on CTAN.