Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2078, Kartik/Mangsir

Program: Diploma in Civil/Hydropower/Architecture/ Electronics/IT/Computer Engineering — **Full Marks: 80**

Year/Part: II/I (2013, 2017, 2014, 2016, 2018) — **Pass Marks: 32**

Subject: Engineering Mathematics - III — **Time: 3 hrs**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt All questions. **[(5+5)x3=30]**

1. a) Using definition, find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ of $f(x,y) = x^2y - xy^2$

   b) *If* $u(x,y,z) = x^2 + y^2 + z^2, x = 2t + 1, y = t + 5$ *and* $Z = 7t$, *then find* $\frac{du}{dt}$

2. a) State limit comparisons test and use it to test the convergent or divergent of the infinite series.

   $\sum \sqrt{n^2+1} - n$

   b) Find the Fourier series of the function

   $$f(x) = \begin{cases} 1 & -\pi < x\ 0 \\ -1 & 0 \le x < \pi \end{cases}$$

3. a) Define a group and prove that the identify element of group is unique. Again prove that the inverse of a group is unique.

   b) Let $s = \{0,1,2,3,4\}$. Show that S forms a group under the addition modulo 5.

Group 'B'

Attempt Any Five questions. **[5x10=50]**

4. Solve by separating the variables : $\sqrt{1-x^2}\,dy + \sqrt{1-y^2}\,dx = 0$

5. Solve the homogeneous differential equation : $\frac{dy}{dx} = \frac{x^2+y^2}{2x^2}$

Cont.....

7-3

6. Solve the partial differential equations (Any one).

a) $z = ax + by + a^2 + b^2$ b) $xp - yq + x^2 - y^2 = 0$

7. Solve : $(mz - ny)p + (nx - lz)q = ly - mx$

8. Test the convergent of the series and find its sum if convergent:

$$3 + \frac{3}{-4} + \frac{3}{(-4)^2} + \cdots\cdots$$

9. Test whether the given series below is absolutely convergent of conditionally convergent $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n}}$

10. Find the interval and radius of convergence of the power series :

$1 + 2x + 4x^2 + 8x^3 + \cdots$

Good Luck!

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Group 'B'

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5. Solve the homogeneous differential equation : $\frac{dy}{dx} = \frac{x^2+y^2}{2x^2}$

Cont.....

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Program:	**Diploma in Computer Engineering**	**Full Marks: 80**
Year/Part:	**II/I (2018 New Course)**	**Pass Marks: 32**
Subject:	**Database Management System**	**Time: 3 hrs**

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt Any Eight questions.

1. Define terms data, information, database and DBMS. [10]
2. What are the different types of data models? Explain any two of them in brief. [10]
3. Explain ER diagram. What are entity, attributes and keys? Describe different types of relationship. [4+2+4]
4. Draw ER diagram for Hotel Management System where customers check in and chec kout of the room. Hotel also contains pre-booking facility. [10]
5. Define SQL in brief. [10]

EMPLOYEE

Emp id	Name	Salary	Address
101	Ravi Regmi	2000	Butwal
102	Keshab Bashyal	8000	Kathmandu
103	Angeeta Rijal	20,000	Surkhet
104	Rajeev Khadka	10,000	Gulmi

Write the table given as above.

a) Write a query to show the employee name list from table whose name starts with "R".

b) Write a query to show the employee whose salary is greater than 8000.

6. Why normalization is needed in database. Explain 1NF, 2NF, 3NF. [10]
7. What is transaction? Explain ACID properties of transaction. [10]
8. Write short notes on : **(Any Two)** **[2x5=10]**
   a) Advantages of DBMS approach
   b) Relational Mapping
   c) Data recovery
9. Explain two-Phase Locking and Time-stamp Ordering Techniques. [10]

Good Luck !

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Program:	**Diploma in IT/Computer Engineering**	**Full Marks: 80**
Year/Part:	**II/I (2016, 2018 New Course)**	**Pass Marks: 32**
Subject:	**Electronic Devices and Circuits**	**Time: 3 hrs.**

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt Any Five questions.

1. a) Define resistor and capacitor. Find the resistance value of following color code. [4+4]
   i. Red, Green, Blue, Gold
   ii. Yellow, Gray, Red, Silver

   b) Define extrinsic semiconductor device. Briefly explain how depletion region in formed and how barrier potential is developed in a junction diode. [2+6]

2. a) List out the different equivalent diode models with figure. Briefly explain about the VI characteristics of a PN junction diode in forward biased mode. [4+4]

   b) Explain the principle of operation of zener diode in the reverse breakdown region with clear diagram [8]

3. a) Define rectifier. Explain the working principle of half-wave rectifier with clear diagram. [2+6]

   b) Define BJT. Explain the input and output characteristics of CC configuration amplifier with necessary diagram. [2+6]

4. a) Explain the construction and working principle of N-channel MOSFET in detail. [8]

   b) Explain the characteristic of class A amplifier with clear diagram. [8]

5. a) Explain about LED and LDR in brief. [4+4]

   b) Explain the construction of SCR and its characteristics in detail. [4+4]

6. Write short notes on : **(Any Four)** [4x4]
   a) Triode
   b) Thermistor
   c) UJT
   d) Multi-vibrator
   e) NPN Transistor
   e) Types of Capacitor

Good Luck !

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Program:	**Diploma in IT / Computer Engineering**	**Full Marks: 80**
Year/Part:	**II/I (2016, 2018 New Course)**	**Pass Marks: 32**
Subject:	**Data Structure & Algorithm**	**Time: 3 hrs**

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt Any Eight questions.

1. Illustrate the importance of stack with definition. Write source code to implement stack operation. [4+6]
2. Explain queue with an example? Write an algorithm of circular queue. [10]
3. Write algorithm to insert and delete a node after an existing node in doubly linked list. [10]
4. How does recursion differ from other function? Write a recursive function to find the factorial of an input integer. [4+6]
5. What is AVL tree? Draw the AVL tree for the following sequence of data: [10]

   2, 7, 6, 4, 9, 10, 12, 8, 5
6. Define Tree with example. Draw the binary search tree for: [2+8]

   Pre-order: ABCEIFJDGHKL

   in-order: EICFJBGDKHLA
7. What is array? List some examples array application. Write codes to search an integer 40 in array list of 15 elements. [2+2+6]
8. What is sorting? Sort the following list of numbers using insertion sort. [10]

   44, 33, 55, 77, 90, 40, 60, 99, 22, 88, 66
9. Explain the various types of graph with example. [10]
10. Write short notes on : **(Any Two)** [2x5=10]

    a) Linear queue
    b) Linked list
    c) Depth first traversal
    d) Hashing

Good Luck !

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Program:	**Diploma in IT/Computer Engineering**	**Full Marks: 80**
Year/Part:	**II/I (2016, 2018 New Course)**	**Pass Marks: 32**
Subject:	**Microprocessors**	**Time: 3 hrs**

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt Any Five questions.

1. a) Define microprocessor and microcontroller. Explain Von-Neumann's architecture with block diagram. [2+6]
   b) Draw and explain 3 bus architecture of a micro-computer system. [8]
2. a) Draw a neat diagram of internal architecture of 8085 microprocessor and explain briefly. [10]
   b) WALP to check whether the content of register B and C are equal or not. If the two contents are equal, then display OOH in an output part 32H else display FFH in output part 23H. [6]
3. a) Explain the addressing modes in 8085. [6]
   b) WALP to multiply (5*6) two numbers. [4]
   c) WALP to load 01H and 03H in register B and C respectively. Increment the content of both the register by one. Exchange the content of both registers. Add both the numbers & output the result at an output device with address 12H. [6]
4. a) Define Fetch and execute cycles. Draw and explain the timing diagram of memory write cycle. [2+6]
   b) Explain 8085 flag register in detail. Define stack and subroutine. [5+3]
5. a) Define memory interfacing. Explain about address decoding using NAND and block decoders. [2+6]
   b) Interface 8kB×8 R/W memory to microprocessor. [6]
   c) Describe the address decoding and its types according to mapping. [4]
6. a) Define interrupt. Explain 8085 chained interrupt. [8]
   b) Write short notes on : **(Any TWO)** [2x4]
   i) SAP ii) DMA iii) 8251 USART

Good Luck !