B.Sc (MPCs) III year – V Semester End Semester Examinations February 2021 Subject: Applied Physics (SEC)

Subject ID : 5APP313	Date :02-03-2021
Max.Marks:30	Time: 2hrs 30 minutes

Answer All the Questions. Each question carries 10 marks.

1. A) Explain with neat diagram the principle working of a He-Ne Laser. Why is it necessary to use narrow tube?

(\mathbf{OR})

- B) What are the Einstein's coefficients? Obtain an expression for it.
- 2. A) Draw the diagram for an optical fiber link and explain the functions of each block.

(**OR**)

B) Compare the mono mode step index fibre with a multi mode step index fibre explain with neat sketch in detail.

3. A) Define LASER. Explain spontaneous emission, stimulated emission and population inversion. Write the medical and industrial applications of lasers.

(**OR**)

B) What is Total Internal reflection? Explain the construction and working mechanism of Single Mode Step index fiber. Write various advantages and disadvantages of Optical fibers.

3x10M=30M

B.Sc (MECs) III year – V Semester End Semester Examinations February 2021 Subject: Basic Arduino Programming (SEC)

Subject ID : 5ARP314 Max.Marks:30 Date :02-03-2021 Time: 2hrs 30 minutes

I. Answer ALL the Questions

1. A) Explain any three conditional loops with an example sketch

OR

- B) Explain the setup and loop functions in an Arduino program.
- C) Write a sketch to read the digital data and display the message.
- 2. A) Write a sketch to glow LEDs using arrays
 - B) Explain data types in Arduino

OR

B) Explain strings functionality in Arduino with the help of a sketch.

- 3. A). Explain arrays in Arduino with an example sketch.
 - OR
 - B) Explain mathematical operators in Arduino

3x10 = 30 Marks

B.Sc (MSCs) III year – V Semester End Semester Examinations February 2021 Subject: R Programming (SEC)

Subject ID : 5RPM312 Max.Marks: 30 Date :02-03-2021 Time: 2hrs 30 minutes

Note: Answer all the questions

(3x10=30)

1. A. Explain types of data items with example.

(OR)

B. How to create stem and leaf plot with example.

2. A. Explain about Descriptive statistics using examples.

(**OR**)

B. Define correlation and calculate the correlation between 2 variables with example.

3. A. How to convert a number into text data and vice versa with examples.

(**OR**)

B. How to create Histogram and explain with examples.

B.Sc (MECs /MPCs /MSCs) III year Semester-V End Semester Examinations February 2021 Subject: Mathematics-5 (Linear Algebra)

Subject ID : 5MLA301	Date :16-02-2021
Max.Marks:60	Time: 2hrs 30 minutes

Answer all the Questions

4x15=60

a)Whether three vectors (2, 1, 1, 1), (1, 3, 1,-2) and (1, 2, -1, 3) ε R⁴ are linearly independent or linearly dependent.

OR

b) If W_1 and W_2 are two subspaces of a finite dimensional vector space V (F), then $\dim(W_1 + W_2) = \dim W_1 + \dim W_2 - \dim(W_1 \cap W_2)$

- 2. a)State and Prove Rank Nullity theorem. ORb)State and prove Basis theorem.
- 3. a). Show that the mapping $T: V_3(R) \to V_2(R)$ defined as T(a,b,c) = (3a-2b+c,a-3b-2c) Is a linear transformation from $V_3(R)$ into $V_2(R)$

OR

b)Find the matrix of the linear transformation T on V₃(*R*) defined as T(a,b,c) = (2b+c,a-4b,3a)with respect to the ordered basis $B = \{(1,0,0), (0,1,0), (0,0,1)\}$

4. a)State and prove Schwartz's inequality theorem an inner product space V (F).

OR

b) If α and β are vectors in an inner product space V(F) and a, b \in F then prove that

(i).
$$\|a\alpha + b\beta\|^2 = |a|^2 \|\alpha\|^2 + a\overline{b}(\alpha, \beta) + \overline{ab}(\beta, \alpha) + |b|^2 \|\beta\|^2$$

(ii). $\operatorname{Re}(\alpha, \beta) = \frac{1}{4} \|\alpha + \beta\|^2 - \frac{1}{4} \|\alpha - \beta\|^2$

B.Sc (MSCs/MPCs/MECs) III Year – V Semester End Semester Examinations February 2021 Subject: Mathematics-6 (Integral Calculus)

Su	ibject ID : 5MIC302	Date :18-02-2021
M	ax.Marks:60	Time: 2hrs 30 minutes
Ar	nswer all questions:	[4X15=60M]
1.	Evaluate $\int_{C} (x^2 + y^2) dy$ and where C is the arc of the parabola $y^2 = 4$	ax
	OR	
2.	Show that $\int_C \frac{ydx - xdy}{x^2 + y^2} = -2\prod$ around the circle $C: x^2 + y^2 = 1$ or any sin	mple closed curve
3.	Evaluate the integrals $\int_{0}^{\pi/2} \int_{0}^{1} e^x \cos y dx dy$	
	OR	
4.	Sketch the region of integration, reverse the order of integration, and integrals $\int_{1}^{1} \int_{1}^{x} (2-x-y) dy dx$.	evaluate both interated

5. Evaluate the triple integral for $f(x, y, z) = x^2 e^y + xyz$ on $B = [-2, 3] \times [0, 1] \times [0, 5]$

OR

6. Evaluate
$$\int_{1}^{3} \int_{0}^{z} \int_{1}^{xz} (x+2y+z) dy dx dz$$

7. Using Polar coordinates show that $\int_0^1 dx \int_0^x \sqrt{\left(x^2 + y^2\right)} dy = \frac{1}{6} \left[\sqrt{2} + \log\left[1 + \sqrt{2}\right]\right]$

OR

8. Find the area of the surface of the sphere $x^2 + y^2 + z^2 = a^2$ which lies inside the Cylinder $x^2 + y^2 = ay$

B.Sc (MSCs/MPCs/MECs) III Year – V Semester End Semester Examinations February 2021 Subject: Mathematics-6 (Integral Calculus)

Subject ID : 5MIC302	Date :18-02-2021
Max.Marks:60	Time: 2hrs 30 minutes
Answer all questions:	[4X15=60M]
1. Evaluate $\int_{C} yz dx - xz dy + xy dz$ where C is the line segment from (1,1,2)to((5,3,1)
OR	
2. Show that $\int_C \frac{ydx - xdy}{x^2 + y^2} = -2\prod$ around the circle $C: x^2 + y^2 = 1$ or any sin	nple closed curve
3. State and Prove Fubini's theorem for double integrals	
OR	

4. Sketch the region of integration, reverse the order of integration, and evaluate both interated integrals $\int_{1}^{1} \int_{1}^{x} (2 - x - y_{c}) dy dy$

5. Evaluate
$$\int_{1}^{3} \int_{0}^{z} \int_{1}^{xz} (x+2y+z) dy dx dz$$

OR

6. Evaluate $\int_{0}^{1} \int_{1+y}^{2y} \int_{z}^{y+z} z dx dz dy$

7. Using Polar coordinates show that $\int_0^1 dx \int_0^x \sqrt{\left(x^2 + y^2\right)} dy = \frac{1}{6} \left[\sqrt{2} + \log\left[1 + \sqrt{2}\right]\right]$ OR

8. Integrate the given function f(x, y, z) = 2x - y + z, W is over the region bounded by the cylinder $z = y^2$, the xy-plane, and the planes x = 0, x = 1, y = -2, y = 2

B.Sc (MECs) III year - V Semester End Semester Examinations February, 2021 Subject: Electronics-5 (Digital Electronics)

Subject ID :5DIE305 Max.Marks:60

Date :20-02-2021 Time: 2hrs 30 minutes

4x15=60

Answer all the Questions

A) Explain conversion between binary & decimal and binary & hexadecimal with examples.
B) Explain conversion between binary and gray code.

OR

- C) What is a logic gate? Explain XOR, NAND & NOR logic gates in detail with truth tables and symbols and mention their uses.
- D) Explain OR gate using diodes as discrete components.
- 2. A) State and prove DeMorgan's theorems with the help of logic gates.B) Realize NOT, AND, OR and XOR logic gates using NAND and NOR gates.

OR

C) Explain grouping of cells in Karnaugh maps and how to simplify a Boolean function into minimized SOP form usingK-maps.

- 3. A) What is a combinational logic circuit? Explain in detail about full adder with the help of block & logic circuit diagrams and truth table.
 - B) Explain an Encoder in detail with the help of diagrams and truth table.

OR

- C) What is a Race problem explain? How this problem can be avoided with master/slave J-K flip flop.
- 4. A) What is a shift register? Explain in detail using serial in serial out shift register as an example with the help of diagrams.

OR

- B) What is a counter? Explain in detail.
- C) With the help of logic & timing diagrams and truth table explain in detail Asynchronous 4-bit binary counter.

B.Sc (MPCs) III Year – V Semester End Semester Examinations February 2021 Subject: Physics -V (Modern Physics)

Subject ID : 5MOP304
Max.Marks:60

Date :20-02-2021 Time: 2hrs 30 minutes

Answer All the questions.

1 A) State and explain the fundamental postulates on Bhor's theory of hydrogen atom and explain the drawbacks of Bhor's atomic model.

Or

- B) What is Photoelectric effect? Derive the Einstein's photoelectric equation.
- 2 A) Describe the Davisson and Germer experiment to demonstrate the wave character of electron.

Or

- B) Derive the Schroedinger time-independent wave equation.
- 3 A) Write the importance of pure rotational spectrum for determining the properties of a molecule.

Or

- B) What is Raman effect? Describe the experimental set-up to study Raman effect.
- 4 A) Write the properties of nucleus with reference to size, charge, mass, nuclear spin, magnetic dipole moment and electric quadrupole moment.

Or

B) Discuss the liquid drop model of Nucleus.

4 x 15 M=60 M

B.Sc (MSCs) III Year – V Semester End Semester Examinations February 2021 Subject: Statistics-V

Sampling Techniques, Time Series and Demand Analysis

Subject ID : 5STT303 Max.Marks:60

Answer all the Questions:

1. A) Define the following terms with example i) Sample ii) Population

on iii) Non-sampling Error

(OR)

- B) Explain in detail about the various types of Sampling Methods. Write down the Limitations of the same.
- 2. A) In SRSWR, Prove that sample mean is an unbiased estimator of population mean

(OR)

- B) Compare and contrast between SRSWR and SRSWOR
- 3. A)) Fit a straight line by least square method to the following data. Estimate the trend values. Estimate the Production for the year 2015.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production	27	38	44	35	51	58	50	54	62
(OR)									

B) Obtain seasonal indices to the following data by using Ratio to Trend Method

	Quarters	Ι	II	III	IV
Year					
	2011	65	58	56	61
	2012	68	63	63	67
	2013	70	59	56	52
	2014	60	55	61	58

4. A) Explain about Leontief's method

(OR)

B) Brief about the various methods of Measuring Elasticity of Demand.

4x15=60

Date :20-02-2021

Time: 2hrs 30 minutes

B.Sc (MECs) III Year – V Semester End Semester Examinations February 2021 Subject: Electronics -VI (8051 Micro Controller)

Subject ID : 5EMC308	Date :23-02-2021
Max.Marks:60	Time: 2hrs 30 minutes

I. Answer ALL the Questions.

1. A) Draw the block diagram of 8051 microcontroller and explain its blocks.

OR

- B) Draw the pin out diagram of 8051 microcontroller and explain few important pins.
- 2. A) Explain arithmetic group of instructions of 8051 microcontroller.

OR

- B) Explain addressing modes used in 8051 microcontroller.
- C) Explain RL, RR, RLC & RRC instructions.
- 3. A) Write an ALP to pick biggest number from a series of 15 numbers.B) Write an embedded C program to send port P1 from 1 to E.

OR

- C) Write an ALP to find π (Pi) value up to 5 decimal places.
- D) Write an embedded C program to toggle port P1 pin continuously using inverter.
- 4. A) Explain timers in 8051 microcontroller and explain configuration of TMOD register.

OR

B) Explain simplex, half duplex and full duplex and also explain RS 232.

4x15=60M

B.Sc (MPCs) III Year – V Semester End Semester Examinations February 2021 Subject: Physics -VI (Solid State Physics)

Subject ID : 5SSP307 Max.Marks:60

Date :23-02-2021 Time: 2hrs 30 minutes

Answer All the questions.

4 x 15 M=60 M

1 A) Enumerate the seven crystal systems pointing out their characteristics.

Or

- B) What is madelung constant? Explain it with respect to sodium chloride lattice.
- 2 A) Discuss the Debye's theory of specific heat of solids

Or

- B) Write salient features of BCS theory and describe the formation of cooper pairs.
- 3 A) Explain Hall effect and derive equation for Hall coefficient.

Or

- B) Derive the equation for the effective mass of the electron.
- 4 A) Show that area under B-H curve denotes 4π times the energy dissipated per cc of magnetic cycle.

Or

B) Explain the classical theory of electrical polarizability.

B.Sc(MSCs) III year – V Semester Semester Examinations February 2021 Subject: STATISTICS-VI Operation Research

Subject ID : 5SOR306	Date :23-02-2021
Max.Marks:60	Time: 2hrs 30 minutes
Note: Answer all the questions	$4 \ge 15M = 60M$

1. A. Solve the following LPP by using Graphical method Max Z=40x+35y subject to constraints $2x+3y \le 60, 4x+3y \le 96$ and x, $y \ge 0.$ (OR)

B. Discuss about the scope of Operations Research.

2. A. Solve the following LPP by using dual simplex method Min Z= $2x_1+x_2$ subject to constraints $3x_1+x_2 \ge 3$, $4x_1+3x_2 \ge 6$, $x1+2x_2 \ge 3$ and $x_1,x_2 \ge 0$.

(OR)

B. Solve the following LPP by using Two phase method Min Z= x_1 -2 x_2 -3 x_3 subject to constraints -2 x_1 + x_2 +3 x_3 =2, 2 x_1 +3 x_2 +4 x_3 =1 & x1, x2, x3 ≥ 0 .

3. A. Determine the IBFS to the following transportation problem using NWCR and MMM

	D1	D2	D3	D4	Supply
01	6	4	1	5	14
02	8	9	2	7	16
03	4	3	6	2	5
Demand	6	10	15	4	35
(OR)					

B. Explain MODI method to find the optimum solution of a transportation problem.

4. A. We have 7 jobs, each of which to go through the machine M1 and M2 processing times are given below. Determine the sequence of jobs that will minimize the total elapsed time.

	1	2	3	4	5	6	7
M1	13	22	15	16	12	11	9
M2	18	11	12	16	12	10	7
(OR)							

B. Write the uses of stepping stone method as comparing with travelling sales man problem.

B.Sc (MECs / MPCs / MSCs III year

V Semester

End Semester Examinations February 2021

Subject: System Analysis & Design (Computer Science –V)

Su Ma	bject ID : 5CSA309 ax.Marks:60	Date :25-02-2021 Time: 2hrs 30 minutes
An	nswer all the following questions	(4X15=60)
1.	(i) Write a short note on types of Information Systems?(ii) Explain Incremental Model	
	(or)	
	Explain Software Development Life Cycle through Spiral model with th	e help of a diagram
2.	Explain the steps involved in Software Project planning (or)	
	Explain in detail the Make-buy decision and Software risks involved	
3.	Briefly explain the contents of SRS	
	(01)	
	(i)Write a short note on Data dictionary(ii) Differentiate between DFD and ER diagram	
4.	(i)Explain cohesion and Coupling?(ii)List the design principles followed in the process of Software Develo (or)	pment
	List the Golden rules followed in the process of User Interface Design	

B.Sc (MSCs/MPCs/MECs) III Year – V Semester End Semester Examinations February 2021 Subject: Programming in Python

Subject ID : 5PPY310	Date :27-02-2021
Max.Marks:60	Time: 2hrs 30minutes
Answer ALL the Questions.	(4x15=60)

1. A) What is Python Programming? Explain the features of Python Programming and Discuss about Python Literals

OR

- **B**) Explain briefly about Dictionaries and Tuples. Write about basic functions & methods used in Dictionaries and Tuples.
- 2. A) Explain briefly about Conditional and Looping statements with Example programs.

OR

- **B**) Define Functions and Anonymous Functions. Explain User defined functions of Python Programming.
- 3. A) i) Define File and Explain File handling mechanism in Python.ii) Define Modules and Explain briefly about Modules in python.

OR

- **B**) Briefly discuss about Advanced Python Programming Concepts with suitable programs Classes, Objects and Inheritance.
- **4. A)** Write a short note on GUI Programming in Python. Explain any 10 Tkinter widgets with examples.

OR

B) Explain CGI Programming Architecture with the help of a program. Discuss about CGI Environmental Variables
