S. Y. M.Sc.	**School of Science**	**Physics**
PHS 610	**Research Specific Course II**	**Semester – IV**
Thursday 30/05/2019	**End Semester Examination**	**Max Marks: 20.** Time-30 min 2·30 to 3·00 pm
Seat No.	**PRN No.**	**Student Sign.**
Invigilator Sign.	**Examiner Sign.**	**Marks Obtained**

(A)

Instructions: 1) All Questions are compulsory.

2) Mark √ to the correct option. Do not circle.

3) More than one options marked will not be considered for assessment.

4) Rough calculations on paper are not allowed.

5) Use non-programmable calculator is allowed.

			Marks	Bloom's Level	CO
Q.1	**A)**	**Select correct alternative**			
	i)	Which fuel cell consists of hydroxyl ions as charge carriers?			
		a) Molten carbonate fuel cell b) Alkaline fuel cell	01	L2	610.1
		c) PEMFC d) Solid oxide fuel cell			
	ii)	Following is a type of primary cell/battery.			
		a) Lithium battery b) Edison cell	01	L1	610.1
		c) lead acid d) dry cell			
	iii)	The exposure of metal oxide surface to oxidizing gas increases the resistance of material, belongs to ------------ type of gas sensor	01	L1	610.2
		a) FET b) chemiresistive			
		c) potentiometric d) calorimetric			
	iv)	The time interval over which sensor resistance reduces to 10 % of its saturation/maximum value after venting out the gas is called --------------------.	01	L1	610.2
		a) recovery time b) response time			
		c) sensor response d) sensitivity			

ESE

page 1/3

v) The energy available for electrons to make transition to the conduction band at room temperature is --------------------.   01   L2   610.2

    a) 0.25 eV   b) 0.025 eV

    c) 0.0025 eV   d) 0.00025 eV

vi) MATLAB is the abbreviation of ------------------.

    a) Mathematics Laboratory   b) Mathematical Laboratory   01   L1   610.3

    c) Matrix Laboratory   d) Mathematica Laboratory

vii) The --------------- window from MATLAB's is used to create and debug script and function file.   01   L1   610.3

    a) command   b) editor   c) help   d) history

viii) ------------------ is also called as regression analysis.

    a) Interpolation   b) Curve fitting   01   L1   610.4

    c) Intercalculation   d) Plot fitting

ix) The --------------- is a fundamental form that MATLAB uses to store and manipulate data.   01   L1   610.4

    a) array   b) vectors   c) matrix   d) all of these

x) The function to plot histogram of the data is ---------------.   01   L2   610.4

    a) plothist   b) histplot   c) histogram   d) hist

B)   **Fill in the blanks**

i) Operating temperature of Molten carbonate fuel cell is ------------------.   01   L2   610.1

ii) The sensitivity (S) of n-type semiconductor for oxidizing gas is calculated by using --------------------------.   01   L2   610.2

iii) The most preferred heating material used in the fabrication of gas sensors is ------------------------.   01   L2   610.2

iv) In MATLAB the variable name can contain ------------------ characters.   01   L1   610.3

v) -------------------- is the process of estimation of values   01   L1   610.4

ESE

page 2/3

between data points.

C) State True or False

i)	Lead acid battery is a type of secondary battery. --------------	01	L1	610.1
ii)	Electrolytic method is used to make powder for brittle metals. -------------------	01	L1	610.2
iii)	The default line color of plot in MATLAB is blue. ------------	01	L1	610.3
iv)	MATLAB is open source software. ---------------	01	L1	610.4
v)	The modifier to change the font format of the plot to bold is \rm. -------------------	01	L1	610.4

ESE

page 3/3

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2018-19
EXM/P/09/00

S. Y. M. Sc.	School of Science	Physics
PHS 610	Research Specific Course II	Semester – IV
Thursday 30/05/2019	End Semester Examination	Max Marks: 80

Time 2.5 Hrs.
3 to 5.30

Instructions:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Neat diagrams must be drawn wherever necessary.

4) Use of logarithmic table and calculator are allowed.

(B)

Q.2		Answer the following questions	Marks	Blooms Level	CO
	a)	With neat diagrams explain the construction and working of Edison cell and Solid Oxide Fuel Cell.	12	L5	610.1
	b)	State any four applications of fuel cell.	4	L2	610.1
		OR			
	b)	Enlist any four characteristics of fuel cell electrode.	4	L2	610.1

Q.3		Answer the following questions	Marks	Blooms Level	CO
	a)	Write in detail about the script file including creating, saving, running, current folder.	12	L4	610.3
	b)	Explain the assigning operator and the rules for defining variables name with examples.	4	L3	610.3
		OR			
	b)	Write commands for the following expression where a=13, b=4.2 and c=(4a)/a and $d = \frac{abc}{a+b+c}$	4	L3	610.3

    i. $\frac{ab}{d+c} + \frac{da}{cb} - (a - b^2)(c + d)$

    ii. $\frac{\sqrt{a+b}}{d-c} + log(|b - a + c - d|$

Q.4		Answer the following questions	Marks	Blooms Level	CO
	a)	What is physisorption and chemisorption? What reactions	12	L2	610.2

ESE
page 1/2

take place at metal oxide surface when exposed to the oxidizing and reducing gas?

			Marks	Blooms Level	CO
	b)	Explain the characteristics those affect the performance of gas sensing material.	8	L3	610.2

OR

	b)	Explain the electrical properties of compressed powder, thick film and thin films.	8	L3	610.2
	c)	What are different ways of fabricating a gas sensor?	4	L2	610.2

Q.5		**Answer the following questions**	**Marks**	**Blooms Level**	**CO**
	a)	Explain curve fitting and interpolation and how it is done using MATLAB with examples.	12	L3	610.4
	b)	How to plot multiple plots in MATLAB explain with proper examples?	8	L2	610.4

OR

	b)	Write in detail the loops in MATALB?	8	L2	610.4
	c)	What are polynomials? How to input polynomials and find its roots in MATLAB?	4	L3	610.4

ESE

page 2/2