Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Scientific writing **Semester: II**
Program: B.Sc. F & T, B.Sc. Microbiology **Time : 03 hrs.**
Course Code: HSCC 1019 **Max. Marks: 100**

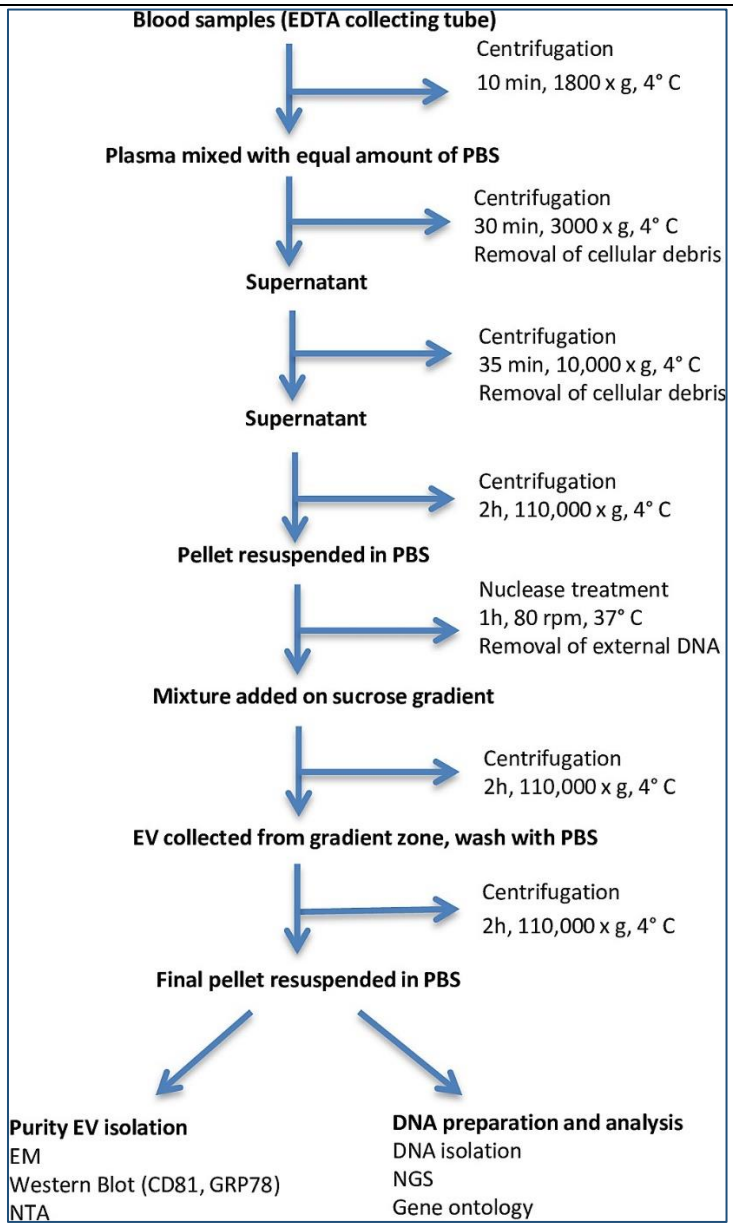
Instructions:

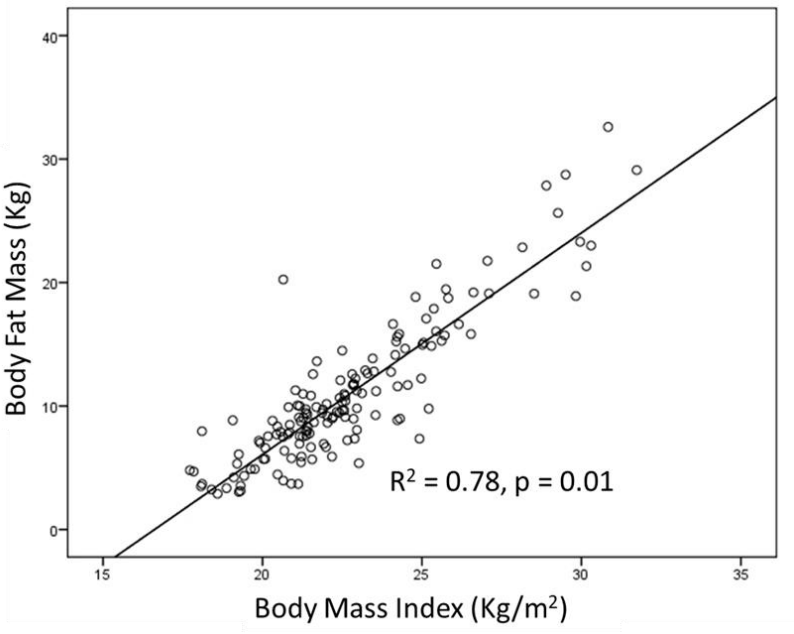
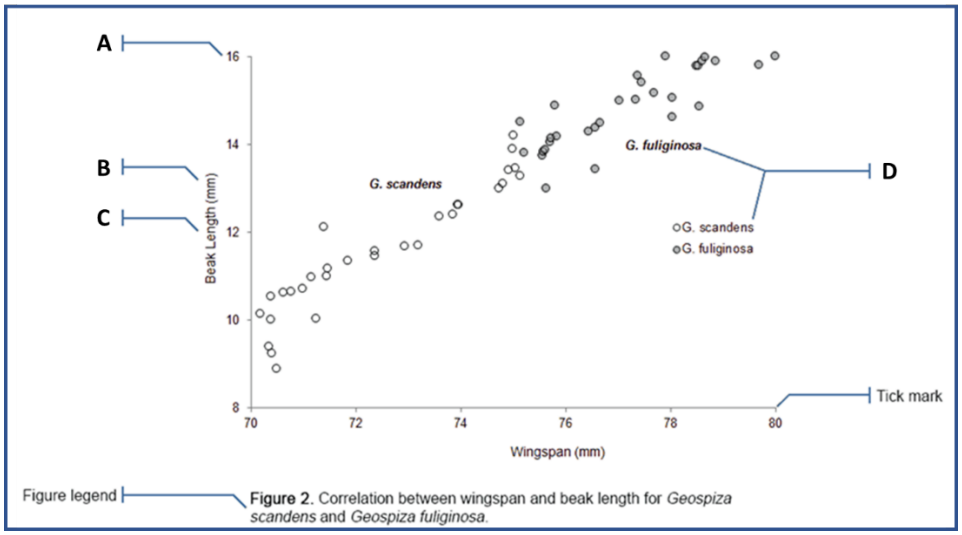
Q.No	Section A Short answer questions/ MCQ/T&F	(20Q x1.5M= 30 Marks)	COs
1.	Which of the following sections is not a basic section of a quantitative research paper? a. Results b. Methods c. References d. Criticisms	1.5	CO3
2.	Which of the following is the main goal of the methods section of a research report? a. Meticulously articulate how you analyzed the data. b. Provide enough detail to allow an independent researcher to replicate your study. c. Outline the demographic information of your participants so that reviewers can access the generalizability of your research. d. Discuss the procedure you used so that readers can decide for themselves if your protocol is biased.	1.5	CO3
3.	Good scientific writing can be described as _____, _____, and _____. a. clear, concise, and convoluted b. concise, dense, and compelling c. clear, concise, and flowery d. clear, concise, and compelling	1.5	CO3
4.	What is the thesis statement? a. the main purpose of your paper b. a summary of all the facts of your paper c. the same thing as the introduction d. the same thing as the conclusion	1.5	CO3
5.	Which of the following is not usually a part of the discussion section in a quantitative research report? a. Present a summary of the important findings and specific results b. Discuss general implications of the research c. Include suggestions for future research and practical applications	1.5	CO3

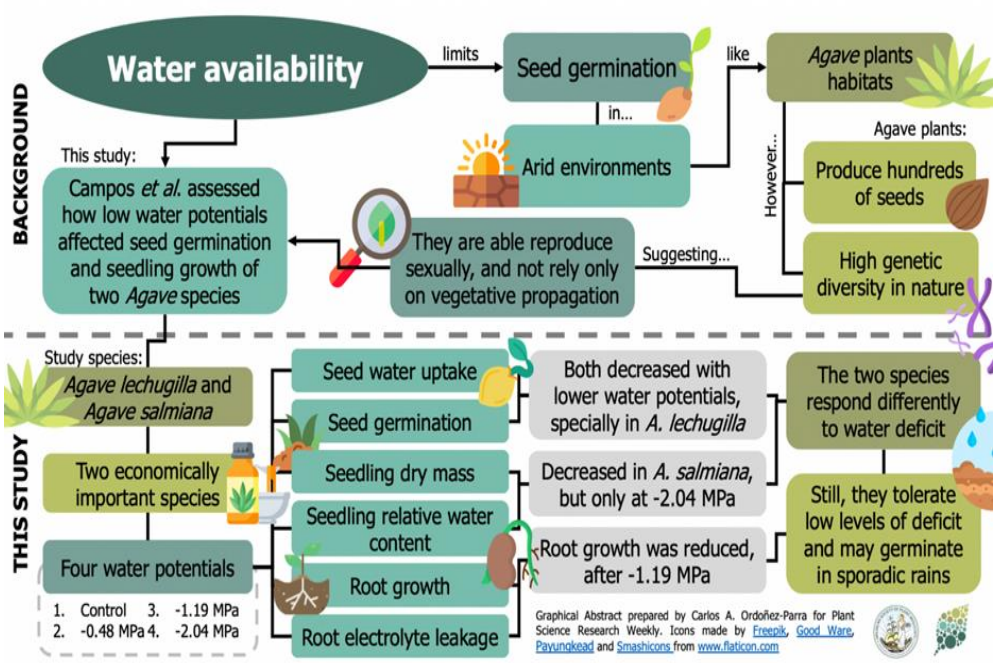
	d. Discussion of what motivates the research and the literature that preceded the current research study.		
6.	Identify which of the following is NOT an example of qualitative research: a. Analyzing the correlation between the number of guns sold and the number of gun crime victims b. Analyzing the transcripts of trials involving gun violence. c. Analyzing the diary of a person who has committed multiple accounts of gun-related violence. d. Analyzing how the legal frameworks regarding gun control have changed over the past 30 years.	1.5	CO4
7.	Which of the following statements is true about the source of data? a. The source of data that is collected and compiled by others is known as secondary data b. The source of data that is collected and compiled by others is known as tertiary data c. The source of data that is collected and compiled by others is known as primary data d. None of the above	1.5	CO4
8.	Which of the following is an accurate representation of the process of conducting research? a. The formulation of hypothesis precedes the collection of data b. The formulation of hypothesis precedes the selection of research tools c. The formulation of hypothesis precedes the statement of objectives d. The formulation of hypothesis precedes the analysis of data	1.5	CO4
9.	What is the distinctive feature of case study research? a. Arriving at generalizations b. Presenting a detailed case history c. Developing an in-depth understanding of the case d. Helping solve the problem of the case	1.5	CO4
10.	George was asked by his administrator to provide some statistics for their school's enrollment trends. To do this, he accessed the last 50 years of enrollment data from the school and summarized the information into a concise report. What kind of research was George doing? a. Secondary research b. Archival research c. Experimental research d. Survey research	1.5	CO4
11.	Give full form of IMRAD.	1.5	CO3
12.	Define discrete and continuous variable.	1.5	CO1

13.	Anna only wants to create an experiment. She will therefore need to create a prediction, then decide what variables can be manipulated and measures, then do what? a) Manipulate one variable and measure its effects on another variable. b) Measure one variable and manipulate its effects on another variable. c) Measure the time to complete the task d) Manipulate two measurable variables and measure its effects on another two variables.	1.5	CO2
14.	Of the following sampling methods, which is a probability method? a) Judgement b) Quota c) Simple random d) Convenience	1.5	CO1
15.	A control group is _____. a) a group that receives one of the treatments b) a group that receives none of the treatments c) a group that receives two of the treatments d) a group that does not participate in the study	1.5	CO1
16.	When someone refers to the population of a study, they are referring to: a) The group of subjects in the study. b) The group of people a researcher is interested in. c) The group of people in geographic proximity to where the study is being conducted. d) Everyone involved in the study, including the researchers.	1.5	CO1
17.	Why do you need to review the existing literature? a) To make sure you have a long list of references b) Because without it, you could never reach the required word-count c) To find out what is already known about your area of interest d) To help in your general studying	1.5	CO2
18.	A systematic literature review is: a) One which starts in your own library, then goes to on-line databases and, finally, to the internet b) A replicable, scientific and transparent process c) One which gives equal attention to the principal contributors to the area d) A responsible, professional process of time-management for research	1.5	CO2
19.	Which one of the following is not considered as plagiarism? a) Make use of the work of another and misrepresent it as your own b) Drawing content from the work of another without acknowledging the source c) Paraphrasing too closely to the original text d) Drawing content from another work and adapting it with due acknowledgment	1.5	CO2

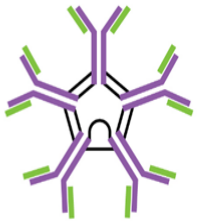
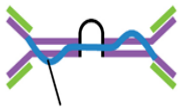
20.	Match the following terms with their definitions a. Global plagiarism b. Verbatim plagiarism c. Paraphrasing plagiarism 1. passing off an entire text by someone else as your own work. 2. stitching together parts of different sources to create your text 3. rephrasing someone else's ideas to present them as your own. 4. directly copying someone else's words 5. recycling your own past work.	1.5	CO2
	Section B	**(4Qx5M= 20 Marks)**	CO
1.	Using the steps in flow chart below, write DNA extraction protocol for a research paper or lab notebook.	5	CO2

			
2.	(A) Below is a data from Body fat mass and Body mass index measure in males. Write an assertive and descriptive legend and a title for the figure. (3)	3+2	CO1

	 (B) Mark "A", "B", "C", "D" in the graph below. (2) 		
3.	Write advantages and disadvantages of qualitative and quantitative methods in data collection.	5	CO4
4.	(A) Define primary, secondary and tertiary sources of literature. Give examples. (3) (B) Which is the most credible source of literature and why? (2)	3+2	CO2
	Section C	**(2Qx15M =30 Marks)**	

1.	 A. Write an appropriate title for the study. (12-17 words) (1) B. What were different experimental conditions used in the study? (2) C. What dependent variables were measured in the study? (3) D. Write a brief summary of the graphical abstract. (150 words) (9)	15	CO1

2.		7+8	CO2

	IgM pentamer	IgG monomer	Secretory IgA dimer	IgE monomer	IgD monomer
					
Heavy chains	μ	γ	α	ε	δ
Number of antigen binding sites	10	2	4	2	2
Molecular weight (Daltons)	900,000	150,000	385,000	200,000	180,000
Percentage of total antibody in serum	6%	80%	13%	0.002%	1%
Crosses placenta	no	yes	no	no	no
Fixes complement	yes	yes	no	no	no
Fc binds to		phagocytes		mast cells and basophils	
Function	Main antibody of primary responses, best at fixing complement; the monomer form of IgM serves as the B cell receptor	Main blood antibody of secondary responses, neutralizes toxins, opsonization	Secreted into mucus, tears, saliva, colostrum	Antibody of allergy and antiparasitic activity	B cell receptor

(A)Write an appropriate figure legend. (10-15 words) (2)
(B) Differentiate between main antibody of primary and secondary response. (2)
(C) Which class of antibody should be targeted to help a person with allergies? (1)
(D) Explain how IgM can help clear antigens faster than other antigens? (2)

Part II

Below is a detailed protocol of an immunological technique ELISA (Enzyme Linked ImmunoSorbent Assay). <u>Identify and write key steps from the ELISA protocol provided below. (8)</u>

The ELISA (Enzyme Linked ImmunoSorbent Assay) is the gold star immunoassay, which means that it is the standard procedure that all new assay technology is compared to during research and development. The ELISA is also fundamental to most clinical tests for diagnosis of disease because it is currently the most characterized and standardized method. The ELISA is an immunoassay, the principle of which relies on the specific recognition between an antibody and antigen. This specificity comes from the unique three dimensional structure of the antibody paratope and the antigen epitope. These two regions fit like a lock and key via non-covalent, charge-

based, and/or hydrophobic interactions. The clinical purpose of the ELISA is to detect either antibody or antigen from a biological fluid such as blood (serum), urine, or saliva. The ELISA is composed of multiple steps. Many of these steps are blocking and washing steps in order to prevent non-specific binding. Non-specific binding occurs when proteins adsorb to each other or to the plastic surface of the ELISA plate via off-target interactions. These interactions are also mediated by charge or hydrophobicity, so they can be mitigated to some extent by blocking and washing.

Prepare a surface to which a known quantity of capture antibody is bound. The ELISA assay is performed in a 96-well polystyrene plate. The wells are chemically treated to make them "sticky" to increase the ability for proteins to adsorb to the surface. The first ELISA step is to immobilize the capture protein to the wells of the plate. There are a handful of different ELISA assay techniques, but here we will focus on the sandwich ELISA. In a sandwich ELISA the capture protein is an antibody and the target is the antigen. Therefore, the first step is to immobilize the capture antibody onto the wells of the 96-well plate. Many ELISA assay kits are available with the capture protein pre-immobilized. Wash off any unadsorbed capture protein from the well surface. Block any unbound sites on the 96-well plate. Proteins such as Bovine Serum Albumin (BSA), Casein, or aprotinin are commonly used to block the ELISA assay. These proteins will adsorb to the plate surface. This will prevent the target protein from adsorbing non-specifically to the plate surface during later steps in the assay, which results in lower background noise. Wash away any unadsorbed blocking proteins from the well. Incubate with the sample (serum, urine, saliva, or spiked research solution). This is the step where the specific recognition between antibody and antigen takes place. In this sandwich format the antibodies are adsorbed the well and are recognizing antigen in the sample fluid. This step requires some incubation time in order to allow the binding kinetics to reach equilibrium. Wash away the incubation fluid. This is a crucial washing step that often requires multiple washes to ensure that any unbound antigen is washed away. Ideally, the only antigens that remain in the well are attached to capture antibodies. Incubate with Detection Antibody. The detection antibody in an ELISA always has some type of conjugated label such as a flurophore for fluorimetry, or an enzyme for colorimetric detection or chemiluminiscence. This antibody recognizes a different epitope on the target antigen than the capture antibody did. As a result, the ELISA assay has a sandwich of capture antibody-antigen-detection antibody. Wash away unbound detection antibody. Apply substrate for chemical colorimetric or chemiluminiscent reactions or apply incident light for fluorescent reactions, and quantify the signal. The amount of fluorescence, luminescence, or intensity of the color indicates how much target antigen was captured from the sample. This is where a high signal and low background/noise is important. A good assay has a high signal to noise ratio and produces a clean result without much background. The better the signal to noise ratio the better the sensitivity of the assay, and the lower the limit of detection. A low limit of detection is the goal of any immunoassay or sensing device. A significant amount of research is directed towards creating state-of-the art devices that can detect ever smaller concentrations of target protein from complex biological samples. These ELISA steps and principles such as blocking, washing, and reducing non-specific binding are crucial to the success of any protein assay.

	Section D	(2Qx10M =20 Marks)	
Q	Statement of question		CO
1.	How does increased air temperature near the soil surface affects the amount of carbon dioxide (CO2) respired from the soil? A researcher wants to design an experiment to know how temperature affects soil respiration. Write down important steps that the researcher must use in experimental design of this study. List variables, hypothesis and suggest “between-subjects” and “within-subjects” experimental design.	10	CO4
2.	(A) Define study/research design. (2) (B) What are four different types of study/research designs. Describe their purpose and characteristics. (8)	2+8	CO3