



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Fundamentals of Psychology

Course Code: APSY-111

Roll No. ....

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

1. Briefly explain the "historical background and schools of psychology".
2. Define Observation, and also explain its different types.
3. Define Perception. Write a short note on Spatial Perception.
4. Differentiate between James Lange's and Cannon Bard's Theory of Emotions.
5. Write a short note on Problem Solving Method.
6. Define Intelligence and Personality.

**Q.2. Answer the following questions: (3x10=30)**

1. Define Motives. Write a detailed note on the Classification of Motives.
2. Define Learning. Write a detailed note on the Methods of Learning.
3. Write a detailed note on Endocrine Glands and their function in the human body.



---

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

---

**Q.1. Answer the following short questions: (6x5=30)**

- i. What are the functions of a Neuron?
- ii. Explain the factors affecting motivation.
- iii. Briefly explain crowd behavior.
- iv. What is the difference between S- factor and G- factor of intelligence?
- v. Explain the monocular cues used in Depth perception.
- vi. Write a note on Humanistic school of Psychology.

**Q.2. Answer the following questions: (3x10=30)**

- i. Explain Operant Conditioning as a type of learning.
- ii. Discuss in detail the different types of memory.
- iii. Explain Thurston's seven factor theory of Intelligence.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Arabic-I

Course Code: ARB-101

Roll No. ....

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

اس پرچہ کو مہیا کی گئی جوابی کاپی پر حل کریں۔

سوال 1	درج ذیل سوالات کے مختصر جوابات تحریر کریں۔ ۱۔ اسم معرفہ کی کوئی سی چار اقسام مثالوں کے ساتھ لکھیں۔ ۲۔ مرکب اضافی کی تعریف کریں اور دو مثالیں بھی تحریر کریں۔ ۳۔ اسم اور فعل کا فرق تحریر کرتے ہوئے دو دو مثالیں دیں۔ ۴۔ مبتدأ اور خبر میں کتنی باتوں میں مطابقت ہوتی ہے؟ مثال کے ساتھ وضاحت کریں۔ ۵۔ جمع مکسر بنانے کا کیا کوئی قاعدہ ہے؟ اس کے کوئی سے تین اوزان مثالوں کے ساتھ تحریر کریں۔ ۶۔ حرف علت کتنے ہیں؟ ان میں سے تین کو جملوں میں استعمال کریں۔	(6x5=30)
سوال 2	درج ذیل عبارت کا اردو میں ترجمہ کریں۔ وَكَانَ إِبرَاهِيمُ يَقُولُ لِرَبِّهِ: يَا أَبِی! لِمَذَا تُعْبُدُ هَذِهِ الْأَصْنَامَ؟ وَیَا أَبِی! لِمَذَا تُسْجُدُ لِهَذِهِ الْأَصْنَامِ؟ وَیَا أَبِی! لِمَذَا تُسَاسُ هَذِهِ الْأَصْنَامَ؟ إِنَّ هَذِهِ الْأَصْنَامَ لَا تَنْتَكِلُ وَلَا تَسْمَعُ! وَإِنَّ هَذِهِ الْأَصْنَامَ لَا تَضُرُّ وَلَا تَنْفَعُ! وَلَئِنْ سَمِعَ لَهَا الطَّعَامَ وَالْمَرْأَةَ؟ وَإِنَّ هَذِهِ الْأَصْنَامَ لَا تَأْكُلُ وَلَا تَشْرَبُ! وَكَانَ أَزْرُ يُغَضِبُ وَلَا يَفْهَمُ۔	10
سوال 3	درج ذیل کا اردو میں ترجمہ کریں۔ ۱۔ لَيْسَ الطَّالِبُ مُجْتَهِدًا۔ ۲۔ هَلْ أَنْتُمْ مُتَعَلِّمُونَ؟ ۳۔ هَلْ أَنْتُمْ خَيَّاطُونَ؟ ۴۔ إِنَّ الْمَرْءَ الصَّالِحَ جَالِسًا۔ ۵۔ نَعَمْ - هُوَ أَسْتَاذٌ مَعْرُوفٌ۔	(5x2=10)
سوال 4	درج ذیل کا عربی میں ترجمہ کریں۔ ۱۔ سراور آنکھ پر۔ ۲۔ بکری کا دودھ لڑکے کے واسطے ہے۔ ۳۔ ظالم بادشاہ پر اللہ کا غضب ہے۔ ۴۔ کیا استاذ بیٹھا ہے۔ ۵۔ کیا حامد و محمود حاضر ہیں۔	(5x2=10)



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Introduction to Business

Course Code: BBA-101

Roll No. ....

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following questions:**

**(6x5=30)**

1. Internal business environment
2. Hybrid entrepreneur
3. Sources of finances for entrepreneurs
4. Types of industries
5. Various stakeholders of business
6. Promoters

**Q.2. Answer the following questions.**

**(3x10=30)**

1. What is a Limited Liability Partnership, and how is it different from ordinary partnership?
2. How business environment influences a business? Explain in details
3. What are major types/classifications of companies?





**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (15x2=30)**

- I. Describe sporophyte in Bryophytes. Explain the structure, development and evolutionary features of sporophyte of *Anthoceros*.
- II. Differentiate Algae and Fungi. Write a note on importance of algae.
- III. Differentiate Powdery Mildews and Rust fungi in detail. Draw life cycle of *Phyllactinia* (Powdery mildews).
- IV. What are Brown Algae? Differentiate Plurilocular and Unilocular sporangia in *Ectocarpus* with the help of labelled diagrams.
- V. Describe Characteristics of Cyanobacteria. Why they are important?
- VI. Write a note on economic importance of smut fungi.

**Q.2. Answer the following questions. (2x15=30)**

1. Explain different parts of Lichen and methods of reproduction in different Lichens.
2. Give detailed account of reproductive structures of *Chara*.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Botany-I (Plant Diversity)

Course Code: BOT-105

Roll No. ....

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

1. What is the basic structure of a virus? Differentiate DNA and RNA viruses.
2. Describe the internal structure of the *Funaria* capsule.
3. What are characteristic features of Gymnosperms? Write a note on their economic importance.
4. Describe the structure and function of the thallus in *Riccia*.
5. What are the main characteristics of *Polysiphonia* that make it easily recognizable?
6. Discuss the effects of *Ustilago* species on crop production.

**Q.2. Answer the following questions. (3x10=30)**

1. Describe different shapes and arrangements of bacterial cells and their significance.
2. What are the differences between monocots and dicots? Explain with examples and diagrams.
3. Describe the process of double fertilization in angiosperms and also discuss the mechanism of seed dispersal in angiosperms.



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

اس پرچہ کو مہیا کی گئی جوابی کاپی پر حل کریں۔

**Q.1. Answer the following short questions:**

**(5x6=30)**

سوال نمبر 1: درج ذیل سوالات کے مختصر جواب تحریر کریں۔

i. Describe the significance of communication.

i. ابلاغ کی اہمیت پر روشنی ڈالیں۔

ii. Narrate the main obstacles in effective communication.

ii. مؤثر ابلاغ کی راہ میں حائل رکاوٹوں کے بارے میں لکھیں۔

iii. Write a short note at the leading newspapers in Pakistani society. Please also share the most frequent content of these newspapers.

iii. پاکستانی مقبول اخبارات میں موجود مواد کے بارے میں تحریر کریں۔

iv. Explain the concept of non-verbal communication types with examples.

iv. غیر لفظی ابلاغ کو مثالوں سے واضح کریں۔

v. Write a brief note at the role of social media to enlighten the youth about climate crisis.

v. سوشل میڈیا جو انہوں کو موسمیاتی تغیرات / اثرات کے بارے میں کیسے آگاہ کر سکتا ہے؟ نوٹ لکھیں۔

**Q.2. Answer the following questions.**

**(3x10=30)**

سوال نمبر 2: درج ذیل سوالات کے تفصیلی جواب تحریر کریں۔

i. Do you agree with an assumption that social media gradually squeeze the traditional mainstream media viewership? Explain it with comparison between traditional media and social media regarding their penetration in society?

i. کیا آپ اس سے متفق ہیں کہ سوشل میڈیا بتدریج روایتی میڈیا کے سامعین کم کر رہا ہے۔ دونوں کی معاشرے میں اثر پذیری بیان کریں۔

ii. Discuss in detail your understanding about the process of communication.

ii. ابلاغ کے عمل پر تفصیلاً نوٹ لکھیں۔

iii. Write a comprehensive note at Agenda Setting Theory.

iii. ایجنڈا سیٹنگ تھیوری کے بارے میں تحریر کریں۔



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(6x5=30)**

- a) What are some major points while editing a draft? \*
- b) Mention some techniques for effective reading.
- c) Difference between controlling and concluding sentence.
- d) How revisions help in better drafting?
- e) Why note taking is important while reading?
- f) What is scanning ?

**Q.2. Answer the following questions.**

**(3x10=30)**

- a) What are reports and its categories?
- b) Name and explain the types of expository writing.
- c) Write an expository essay on:  
Social Media: Shaping identities and influences



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(15x2=30)**

1. What is science?
2. Who is Pythagoras?
3. What is chemical bonding?
4. Write any four inventions from the Greek era?
5. How did science become the dominant method of understanding the natural world?
6. How can we spot fake science?
7. Write the difference between ions and atoms?
8. What is the modern periodic table?
9. What is cellular respiration?
10. Write any two applications of organic chemistry.
11. What is meant by the central dogma?
12. What is photosynthesis?
13. What are the key characteristics of cells as the fundamental unit of life?
14. Differentiate between mitosis and meiosis.
15. What is the theory of relativity?

**Q.2. Answer the following questions.**

**(3x10=30)**

1. What are the advantages of using scientific method and what are its contributions to the Islamic World?
2. Write the contributions of Newton to the scientific world.
3. What is the history of malaria, and how does it affect the world?



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

- a. Briefly explain that how colonialism impacts the culture of a society?
- b. In developing the personality of a person nurture plays an more important role than nature, how? Explain.
- c. What is modernity ? write any three key features of modern societies.
- d. How informal economies evolving over the period of time? Explain.
- e. What does patriarchal culture means? Give an example from Pakistani society.
- f. Write any two important functions of government as an organization.

**Q.2. Answer the following questions. (3x10=30)**

- a. Discuss the role of bureaucracy in the modern states also explain some of its key characteristics.
- b. What is the subject matter of Economic Sociology? Discuss its scope and importance in detail.
- c. Discuss the concept of power and knowledge in detail.



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

#### Q.1. Answer the following short questions: (15x2=30)

- I. Add the improper fractions;  

$$\frac{12}{15} + \frac{13}{18}$$
- II. How much will you earn in 6 months if your salary is Rs.54000 per month?
- III. Convert time of 3000 seconds to minutes.
- IV. Ahmad wants to pack 6000 apples from his garden to deliver to the market in the crates of capacity "50-apples per crate". How many crates are required?
- V. Find the value of  $4 + 5(x + 7)$ , for  $x = 10$ .
- VI. Solve the equation for value of  $x$   

$$13x + 14 = 12x - 5$$
- VII. Convert the following fractions in to decimal form to the nearest hundredth.  

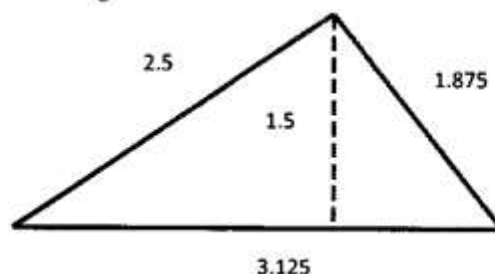
$$\text{a) } \frac{13}{5} \qquad \text{b) } \frac{402}{206}$$
- VIII. Convert 38016 inches to miles, using the facts.  
 $1 \text{ mi} = 1760 \text{ yd}, 1 \text{ yd} = 3 \text{ ft}, 1 \text{ ft} = 12 \text{ in}.$
- IX. Using the formula  $C = \frac{5}{9}(F - 32)$ , calculate the temperature in Celsius for 75°F (Fahrenheit).
- X. Your true height is 68 inches a nurse in hospital measures your height to be 67.5 inches. Find absolute and relative error in this case.
- XI. Simplify the expression  $8 - 3[-2(5 - 7) - 4(2 - 4)]$ .
- XII. The total Federal Budget is amounting Rs. 4,400,000,000,000 and the diameter of a hydrogen nucleus is about 0.000000000000001 meter. Write these values in scientific notation.
- XIII. Write 55 billion and 20 million in figures.
- XIV. There are 80 students in the class if 20% of them are boys. How many numbers of girls are there in the class?
- XV. Find the area of an envelope of length 8 inches and width 14 inches.

#### Answer the following questions. (3x10=30)

- Q. 2 a) Your destination is 90 miles away, and your fuel tank is one quarter full. Capacity of the fuel tank is 12 gallons. Your car average is 25 miles per gallon. Do you need to stop for refueling (Justify your answer)? [5]
- b) You invested Rs. 3000 in the mutual fund on simple interest. Over 4 years, your investment grows in value to Rs. 8500. What is the annual profit rate you got? [5]
- Q. 3 a) Solve the quadratic equation by factoring. [5]  

$$2x^2 + x = 1$$
- b) Solve for  $x$  [5]  

$$\frac{x+1}{3} = 5 - \frac{x+2}{7}$$
- Q. 4 a) The length of a tennis court is 6 feet longer than twice the width. If court's perimeter is 228 feet, what are the court's dimensions? [5]
- b) Find the area of given triangle. [5]





# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Chemistry-I (Physical Chemistry)

Course Code: CHEM-101

Roll No. ....

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

- i. Derive a relation between Gibbs free energy change, entropy change and enthalpy change.  
Give significance of the relation.
- ii. What is difference between true solution and colloidal solution?
- iii. What is catalysis? Give types of catalysis with examples.
- iv. What is surface tension? How can it be determined experimentally?
- v. Derive an expression for entropy of mixing of two ideal gases.
- vi. Briefly describe the dialysis for purification of colloidal system.

**Q.2. Answer the following questions. (3x10=30)**

- i. What is vapor pressure? Discuss the effect of temperature on vapor pressure using Clausius-Clapeyron equation
- ii. Derive and discuss kinetic equation for 1<sup>st</sup> order reaction.
- iii. What is adsorption isotherm? Discuss Langmuir adsorption isotherm.





**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(15x2=30)**

1. Define the term crystal field splitting
2. Draw molecular orbital energy level diagram for O<sub>2</sub> molecule.
3. Why NH<sub>3</sub> is stronger ligand than H<sub>2</sub>O.
4. Why acid bas indicator change colors when pH is changed?
5. Why transition metal salts generally exhibits color?.
6. What is the importance of Coordination Compounds?
7. What is crystal field stabilization energy?
8. Why polarizability increases down the group?
9. Differentiate between hard acid and hard base
10. Why d block elements are called outer transition elements
11. Why lone pair occupies more space?
12. What is leveling effect?
13. Name any two electron deficient inorganic compounds
14. What is the main drawback of MOT?
15. Define the term chelate

**Q.2. Answer the following questions.**

**(3x10=30)**

- A. Describe and compare the structures of following compounds/complexes on the basis of VBT. Also mention two main drawbacks of VBT
- i. [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>      ii. [Co(H<sub>2</sub>O)<sub>6</sub>]<sup>3+</sup>
- B. What is HSAB concept? Discuss its applications?
- C. What is Electronegativity? Discuss its different scales.



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(15x2=30)**

- i. Define the various types of chemical bonding.
- ii. Write two limitations of VSEPR theory.
- iii. How can MOT be applied to a diatomic molecule?
- iv. What are Pauling and Mulliken scales for electronegativity?
- v. Define polarizing power of ions and give example.
- vi. What are the reasons of diagonal relationship?
- vii. Briefly describe Leveling Effect.
- viii. Define the Lewis concept of acid and base with examples.
- ix. What are chelates?
- x. What are various common oxidation states of Manganese and Chromium?
- xi. Briefly describe Werner's Theory.
- xii. What are the key concepts of Crystal Field Theory?
- xiii. What are limitations of VBT for coordination complexes?
- xiv. Briefly explain the role of pKa values for acids and bases.
- xv. Give postulates of VSEPR theory.

**Answer the following questions.**

- i. Briefly describe the periodicity in the properties of outer and inner transition elements. (10)
- ii. Describe various applications of coordination compounds? (10)
- iii. (a) Briefly explain the theory of indicators (5)  
(b) What is soft and hard acid-base concept (SHAB)? Give one application (5)



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(6x5=30)**

- a) Differentiate between Static RAM (SRAM) and Dynamic RAM (DRAM).
- b) Discuss five different types of views available in MS PowerPoint and explain their significance in creating a presentation.
- c) Differentiate between the Dot-Matrix Printer and Laser Printer. Discuss the pros and cons of each.
- d) Explain what an Operating System is and also provide examples of commonly used operating systems.
- e) Explain the use of Hyperlinks in MS Word and PowerPoint. How do they enhance interactivity in documents and presentations?
- f) What are the different types of computer keyboards? Discuss their features and usage scenarios.

**Q.2. Answer the following questions.**

**(3x10=30)**

- a) Discuss the Insert Toolbar in MS Word and its key features. Provide examples of its practical usage.
- b) What is Microsoft Access? Discuss its applications and importance in managing databases.
- c) Describe the working of the Central Processing Unit (CPU) in detail. Discuss its main components and their roles.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Paper: Computer (Introduction and Applications)

Course Code: COMP-111

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Question#1:** Answer the following short questions.

**(6x5=30)**

- a) What is an operating system, and what are different type of operating systems?
- b) Explain the working and advantages of smart input technologies commonly used these days.
- c) Write a note on utility programs.
- d) What is a website and what are the criteria used for evaluating a website?
- e) What is Artificial Intelligence (AI), virtual reality, and machine learning?
- f) What is font style? Illustrate subscript, superscript, and strikethrough effects in Microsoft Word with the help of an example each.

**Answer the following questions.**

**(3x10=30)**

**Question#2:**

What is data and what's the difference between data and information? Discuss the reasons, opportunities and challenges of the huge amount of data being generated these days. Explain the techniques and technologies used for data processing.

**Question#3:**

**Compare and contrast between the following:**

**(2.5 each)**

- a) Printer and Scanner
- b) Bus and Star topology
- c) LAN and WAN
- d) Magnetic storage and Semiconductor storage

**Question#4:**

What is the purpose of Microsoft Excel? Explain the working of SUM, AVERAGE, MAX, COUNT, and COUNTIF functions in Microsoft Excel with the help of examples.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Paper: Principles of Micro Economics

Course Code: ECON-101

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Give short answers to the following concepts. (5x6=30)**

- a. Marginal Utility
- b. Elasticity of supply
- c. Normal goods
- d. Cross elasticity
- e. Indifference Curve

**Q.2. Answer the following questions. (3x10=30)**

- i. Explain the properties of indifference curve with the help of graphs.
- ii. Explain the Law of Diminishing Marginal Utility
- iii. Show graphically the impact of the following on the equilibrium price and quantity when:
  - A. Demand increases and supply falls in equal proportion
  - B. when supply increases more than increase in demand



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Give short answers to the following concepts. (6x5=30)**

1. What distinguishes a centrally planned economy from a market economy?
2. Describe the principle of diminishing marginal utility.
3. How does changing the price of a ticket affect total revenue for a cricket stadium?
4. Suppose a market has the demand function  $Q_d = 25 - 0.5P$ . Using the midpoint method, what is the price elasticity of demand between \$35 and \$45?
5. How do changes in marginal cost affect the average total cost for a firm?
6. Describe the connection between the marginal product of labor and the average product of labor within the short-run production process.

**Q.2. Answer the following questions. (3x10=30)**

- 1) Consider a market for motorcycles where the demand and supply functions are given as follows: Demand:  $Q_d = 800 - 20P$  Supply:  $Q_s = 200 + 10P$ 
  - a) Determine the equilibrium price and quantity in this market. Aid your answer with graph.
  - b) If a new manufacturing technique reduces production costs for motorcycle producers, how would this affect the equilibrium price and quantity of motorcycles?
- 2) If the price of steel, an input into the production of automobiles, rises, and at the same time the price of gasoline rises, what will happen to the equilibrium price and quantity of automobiles? Explain with the help of graph
- 3) Create a graphical illustration depicting the conditions typical of a perfectly competitive market wherein firms encounter economic losses. On your graph, delineate costs, revenue, and the economic losses. Utilize your graph to ascertain whether a firm within this market structure will opt to cease operations temporarily (shut down) or continue its operations. Justify your response.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Fundamentals of Economics

Course Code: ECON-111

Roll No. ....

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Briefly explain the following concepts: (6x5=30)**

- i. Scope and importance of Economics**
- ii. Law of demand with the help of schedule and graph,**
- iii. profit maximization**
- iv. assumptions of perfect competition**
- v. Differentiate GDP & GNP**
- vi. Fiscal Policy**

**Q.2. Answer the following questions. (3x10=30)**

- 1. Define the expansion and contraction, rise and fall in supply with graph.**
- 2. Define price elasticity of supply. How is it measured? Explain with the help of schedule and diagram**
- 3. Differentiate between point and arc elasticity. Explain with the help of schedule and diagram.**



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Briefly explain the following concepts: (6x5=30)**

- i. Scope and importance of Economics
- ii. Law of demand with the help of schedule and graph,
- iii. profit maximization
- iv. assumptions of perfect competition
- v. Differentiate GDP & GNP
- vi. Fiscal Policy

**Q.2. Answer the following questions. (3x10=30)**

1. Define the expansion and contraction, rise and fall in supply with graph.
2. Define price elasticity of supply. How is it measured? Explain with the help of schedule and diagram
3. Differentiate between point and arc elasticity. Explain with the help of schedule and diagram.





# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Pakistan Studies

Course Code: EDE-102

Roll No. ....

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

اس پرچہ کو مہیا کی گئی جوابی کاپی پر حل کریں۔

Q.1. Answer the following short questions.

(5X6=30)

سوال نمبر 1: مندرجہ ذیل سوالات کے مختصر جواب دیجئے۔

I. Shah Wali Ullah

I۔ شاہ ولی اللہ

II. Khilafat Movement

II۔ تحریک خلافت

III. Urdu Hindi Controversy

III۔ اردو ہندی تنازعہ

IV. Geography of Pakistan

IV۔ پاکستان کا جغرافیہ

V. Separation of East Pakistan

V۔ مشرقی پاکستان کی علیحدگی

Answer the following questions.

(2x15=30)

مندرجہ ذیل سوالات کے جواب دیجئے۔

Q. No. 2. Highlight the Early difficulties faced by Pakistan.

سوال نمبر 2۔ پاکستان کو درپیش ابتدائی مشکلات کو اجاگر کریں۔

Q. No. 3. Describe the history of Pakistan's Relations with Muslim World.

سوال نمبر 3۔ مسلم دنیا کے ساتھ پاکستان کے تعلقات کی تاریخ بیان کریں۔



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (15x2=30)**

- i. Who is Mrs. Bell in The Killers?
- ii. What was Ole Andreson's response when Nick suggested him to leave the town?
- iii. Why did Ustad Mangu not like the lawyers' opinion about new constitution?
- iv. Why did the gora soldier quarrel with Ustad Mangu in the cantonment?
- v. How did the happy prince help the writer?
- vi. Why was the happy prince not aware of the miseries of the people before his death?
- vii. Why could the boy not express his love feelings in Araby?
- viii. Why could the boy not buy anything from Araby?
- ix. Why did the killer kill the old man in The Tell Tale Heart?
- x. The killer insists that he is not crazy. Do you agree with him?
- xi. Why did Smirnov come to Popova's house?
- xii. How did Smirnov ridicule the mourning of Popova?
- xiii. Who is Preston?
- xiv. What is Tudor Manor?
- xv. Why did Lettice ask the Wolf to be Christmassy and kind hearted?

**Answer the following questions.**

**Q.2. Explain ONE of the following with reference to the context: 10 Marks**

- a) " But didn't you tell him that since the death of my husband I've stopped receiving?"
- b) "And no burglars, no fires; nothing but weddings and funerals. But now all's changed."

**Q.3. Use any FIVE of the following in your own sentences: (5 X 2) 10 Marks**

- i. Make out, ii. A bed of thorns, iii. Break the ice, iv. A blessing in disguise, v. Turn down
- vi. Pe on the same page, vii. Cry wolf

**Q.4. Write an essay on ONE of the following topics: 10 Marks**

- i. Energy Crisis, ii. Unemployment iii. Life of A Farmer



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions. (6x5=30)**

- (i) What is the difference between active voice and passive voice sentences?
- (ii) What is a noun? How can you distinguish between a concrete noun and an abstract noun?
- (iii) What is the purpose of using articles in English?
- (iv) Briefly explain the structure of an effective presentation.
- (v) What is an interjection? Can interjections be used in formal writing?
- (vi) How do you identify the subject and predicate in a sentence?

**Answer the following questions.**

**Q.2. Read the following passage and answer the questions at the end. The answer must be in your own words. (5x2=10)**

In recent years, the global debate over climate change has reached a critical juncture. With increasing evidence of rising temperatures, extreme weather patterns, and the rapid depletion of natural resources, scientists and policymakers are under pressure to find solutions that balance economic growth with environmental sustainability. The primary concern is the burning of fossil fuels, which releases large amounts of carbon dioxide into the atmosphere, exacerbating the greenhouse effect. One of the key challenges in combating climate change is the reliance on fossil fuels for energy production. In developing nations, access to affordable energy is critical for improving living standards and fostering economic development. However, many of these nations also face the prospect of being hit hardest by the consequences of climate change, such as droughts, flooding, and food insecurity. Balancing the need for energy with the imperative to protect the planet is a delicate task that requires innovative solutions, including the development of renewable energy sources such as solar and wind power. At the same time, the transition to a low-carbon economy also presents significant social and economic challenges. The coal, oil, and gas industries provide millions of jobs worldwide, and the shift away from these sectors could result in significant job losses. Governments must not only invest in renewable energy technologies but also ensure that workers in fossil fuel industries are provided with the training and support necessary to transition to new roles. Moreover, the cost of implementing green technologies is high, and many nations struggle to allocate the necessary funds without sacrificing other important priorities, such as healthcare and education. As the effects of climate change continue to intensify, it is clear that addressing this issue will require unprecedented levels of global cooperation. National governments, international organizations, and private

corporations must work together to develop sustainable solutions that protect the environment while also fostering economic growth and social equity. It is no longer enough for individual nations to act in isolation; the future of the planet depends on collective action.

Questions:

1. What is the primary cause of climate change discussed in the passage?
2. How do developing nations face a dilemma in addressing climate change?
3. What are two challenges of transitioning to a low-carbon economy?
4. Why is global cooperation emphasized in the fight against climate change.
5. Suggest a suitable title for the passage.

Q.3 Write a well-structured paragraph on the topic "Online Learning". (10)

Q.4 Translate the given passage into English. (10)

انٹرنیٹ کی آمد کے ساتھ ہی دنیا سٹ کر ایک گاؤں کی شکل اختیار کر گئی ہے۔ آج انٹرنیٹ ہر شخص کو اس کی ضرورت کے مطابق معلومات فراہم کرتا ہے۔ ماہرین کے مطابق اب کوئی شعبہ ایسا نہیں جس کے متعلق انٹرنیٹ پر معلومات دستیاب نہ ہوں۔ پہلے تو انٹرنیٹ کو صرف اور صرف تعلیمی اور حکومتی ادارے ہی استعمال کرتے رہے مگر اب ہر شعبے کے لوگوں نے اسے استعمال کرنا شروع کر دیا ہے۔ انٹرنیٹ کوئی خاص پروگرام نہیں ہے۔ یہ لاتعداد کمپیوٹروں کے درمیان ایک مضبوط الحاق ہے جس کے ذریعے لاتعداد افراد معلومات کا تبادلہ کرتے ہیں۔



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(6x5=30)**

- (i) What are **THE DESIGN FEATURES** of language? Briefly explain any three.
- (ii) Identify any three **PRIMARY FUNCTIONS OF LANGUAGE** and provide examples of how they are used in everyday communication.
- (iii) Differentiate between **DIACHRONIC AND SYNCHRONIC** approaches to linguistics. Provide an example of each approach.
- (iv) What is the difference between **DENOTATION AND CONNOTATION**? Provide an example to illustrate.
- (v) What are **HOMONYMS**? Give two examples from English.
- (vi) How does understanding **SYNTAX AND SEMANTICS** help in identifying the meaning of complex sentences? Provide an example to support your answer.

**Answer the following questions.**

**(3x10=30)**

- Q.No.2.** Compare and contrast the **DIACHRONIC APPROACH** with the study of language functions. How might the two approaches complement each other?
- Q.No.3.** Explain the distinction between **PHONEMES AND ALLOPHONES** in English phonology. Provide examples to illustrate their roles in distinguishing meaning.
- Q.No.4.** Discuss the **CONCEPT OF SYLLABLE STRUCTURE** in English. How are onset, nucleus, and coda components identified? Provide examples.



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Read the paragraph carefully and answer the following questions:**

Great progress has been made by America in the field of mechanisation. It is spending lavishly on labour-saving machines. Efficient organisation of a highly mechanised system has resulted in maximum productivity in America. With mass production, the amenities of life are available to almost every citizen. On the contrary Europe subordinates the use of machines to human happiness and welfare. It encourages man's reliance on his own faculties and realises the dangers inherent in the American scheme. However great the advantages of mechanisation, it crushes the creative faculty of man and makes a machine out of him." His individual liberty and personality suffer an irretrievable loss. In his moments of leisure the worker finds it difficult to turn his hands to creative work because the machine-made goods do not inspire him in the direction of refinement. These goods also lose their fascination because mass-production has given a setback to the individuality of the articles produced. The Europeans, therefore, contend that it is better to sacrifice a few material comforts than crush the aesthetic and spiritual urge in the individual which large scale mechanisation is doing in America.

- 1) How have aesthetic faculties curtailed in America? (5)
- 2) How is mechanized system effective in America? (5)
- 3) What are Europeans different from Americans? (5)
- 4) Suggest a suitable title for the passage. (5)
- 5) Write a précis of the passage. (10)

**Q.2) Write a paragraph of 250-300 words on any one of the following topics: (20)**

- 1) Face to face learning vs online learning.
- 2) Quaid-e-Azam a great leader.
- 3) Dignity of labour.

**Q.3) Answer the following GAT words: (10)**

- |             |             |               |
|-------------|-------------|---------------|
| 1) Abduct   | 2) Agitator | 3) Bawdy.     |
| 4) Conflict | 5) Deter    | 6) Empirical. |
| 7) Flints.  | 8) Glance.  | 9) Iceberg.   |
| 10) Liturgy |             |               |



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: English-I (Functional English)

Course Code: ENG-117

Roll No. ....

Time: 3 Hrs.

Marks: 60

## THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Give short answers to the following questions. (6x5=30)

- What are different types of Articles? Elaborate?
- What is a Verb? What are its different forms? Give examples.
- What are the Parts of Speech?
- Punctuate the following line.  
"father is watching tv with a cup of tea and cheese cake he pays no attention to saimas crying his wife has gone to the mall for shopping"
- Change the voice of the following sentence.  
"Danish is playing cricket"
- Define Adjective and its importance in a sentence?

Answers to the following questions

(3x10=30)

Q.2. Read the passage and answer the questions given at the end.

Health is one of the most valuable aspects of human life, as it directly impacts our ability to live a productive and fulfilling life. A healthy lifestyle involves a balanced diet, regular physical activity, adequate rest, and mental well-being. However, many people face health challenges due to poor lifestyle choices, environmental factors, or lack of access to healthcare. Chronic diseases such as diabetes, heart disease, and obesity are becoming more prevalent, and they often result from unhealthy eating habits, sedentary lifestyles, and stress. Preventive measures such as regular exercise, proper nutrition, and stress management techniques can help reduce the risk of these diseases. Governments, healthcare providers, and individuals must work together to promote health education, increase access to healthcare, and encourage healthier living habits to improve overall public health."

### Questions:

- What are the key components of a healthy lifestyle?
- What are some of the health challenges that people face today?
- How do unhealthy eating habits and sedentary lifestyles contribute to chronic diseases?
- What preventive measures can reduce the risk of chronic diseases?
- What role do governments, healthcare providers, and individuals play in improving public health?

Q.3. Write a paragraph on one of the following.

- Festivals in Pakistan
- Smog and its effects
- Importance of Sports

Q.4. Translate the following passage into English.

آج کل کے بچے نہایت سمجھدار اور تیز ترار ہیں۔ یہ بہت جلدی نئی چیزوں کا استعمال کرنا سیکھ جاتے ہیں۔ یہ بھی مشاہدہ کیا گیا ہے کہ ان میں بے چینی اور چڑچڑاہٹ پایا جاتا ہے جس کو ڈاکٹر زیادہ سے زیادہ ٹیکنالوجی کے استعمال کی وجہ مانتے ہیں۔ اچھی تعلیم کے ذریعے ان بچوں کی ذہنی صلاحیتوں کا بہترین فائدہ اٹھایا جا سکتا ہے۔



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Subject: Introduction to ICT

Paper: GE-161

Roll No. ....

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions.**

**(6x5=30)**

- a) Differentiate between Internet and intranet.
- b) What is ASCII Coding System?
- c) What are buses? And also discuss its functions inside the computer system
- d) Discuss briefly with example about simplex transmission.
- e) What is virtual memory? And its role in computer system.
- f) What is web browser? List out some famous web browsers.

**Q.2. Answer the following questions.**

**(3x10=30)**

- a) What is E-Commerce? And also discuss role of computer in E-Commerce business models: B2C, C2C, B2G.
- b) Differentiate among MS-DOS, Windows, and Linux operating systems.
- c) Write a note on a brief history of the Internet.





**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions.**

**(6x5=30)**

- i. What are the characteristics of a paragraph?
- ii. Write features of a descriptive essay.
- iii. Define and explain persuasive writing.
- iv. Define an essay. Explain its characteristic features.
- v. What is a narrative essay? Explain.
- vi. Define a short story. Give its salient features.

**Q.2. Answer the following questions.**

**(3x10=30)**

- i. Write an essay on the topic 'Uses and Abuses of Examinations'.
- ii. Describe oral presentation skills.
- iii. Write a dialogue between two friends about rising prices of commodities.



Question No. 1: Give short answers to the following fifteen (15) components.

(15x2=30)

- 1- Which Sahabi is called Jama Al-Qur'an?
- 2- What is the relationship between Quran Majeed and Ramadan?
- 3- What is the reason for the fame of Ghar-E-Hira?
- 4- What is meant by Laila-ul-Qadr?
- 5- What is meant by Tadween-e-Qur'an?
- 6- What is meant by ta'awuz and tasmia?
- 7- What is meant by Hadith-e-Qudsi?
- 8- Write the name of the books of Sahaha Sita.
- 9- Write four Musaaraf-e-Zakat.
- 10 - When did prayer and fasting become obligatory?
- 11 - What is meant by Halaf-ul-Fadhul?
- 12 - Write the names of the four wives of the Holy Prophet (peace be upon him).
- 13- Write two sources of Islamic jurisprudence.
- 14 - Write the literal and terminological meaning of the 'Ijma'.
- 15- Write the Pillars of Qiyas.

Write detailed answers to the following questions.

Question No. 2: Explain the need and importance of Hadith.

Question No.3: Write the background of Hudaibiyyah reconciliation and the conditions of reconciliation.

Question No. 4 Write suggestions to improve the economy of Pakistan.

### (مختصر سوالات)

(30)

سوال نمبر 1: درج ذیل پندرہ (15) اہم کے مختصر جواب دیجیے۔

- 1- جامع القرآن کس صحابی کو کہا جاتا ہے؟
- 2- قرآن مجید کا رمضان سے کیا تعلق ہے؟
- 3- غار حرا کی وجہ شہرت کیا ہے؟
- 4- لیلہ القدر سے کیا مراد ہے؟
- 5- تدوین قرآن سے کیا مراد ہے؟
- 6- تعویذ اور تسبیح سے کیا مراد ہے؟
- 7- حدیث قدسی سے کیا مراد ہے؟
- 8- صحاح ستہ کی کتب کا نام لکھیں۔
- 9- زکوٰۃ کے چار مصارف لکھیں۔
- 10- نماز باجماعت ادا کرنا اور روزے کب فرض ہوئے؟
- 11- حلف الفضول سے کیا مراد ہے؟
- 12- حضور اکرم ﷺ کی چار ازواج کے نام لکھیں۔
- 13- اسلامی فقہ کے دو مصادر لکھیں۔
- 14- اجماع کے لغوی اور اصطلاحی معنی لکھیں۔
- 15- قیاس کے ارکان لکھیں۔

### درج ذیل تین (03) سوالات کے تفصیلی جواب تحریر کیجیے۔

(10)

سوال نمبر 2: حدیث کی ضرورت اور اہمیت بیان کریں۔

(10)

سوال نمبر 3: صلح حدیبیہ کا پس منظر اور صلح کی شرائط لکھیں۔

(10)

سوال نمبر 4: پاکستان کی معیشت کو بہتر کرنے کے لیے تجاویز لکھیں۔

## **ETHICS (For Non-Muslim Candidates)**

**Note: Answer the following questions.**

**(3x20=60)**

**نوٹ: مندرجہ ذیل سوالات کے جواب تحریر کیجئے۔**

**سوال نمبر ۱: خدمت خلق کے بارے میں مختلف مذاہب کے نظریات بیان کیجئے۔**

**Describe viewpoint of different religions regarding human welfare.**

**سوال نمبر ۲: اخلاقی تعلیمات انسانی زندگی کے کن پہلوؤں پر محیط ہیں۔**

**How many facets of ethical teachings have on human life.**

**سوال نمبر ۳: اسلام اور ہندومت کی اخلاقی اقدار کا موازنہ کیجئے۔**

**Give a comparative analysis of moral values of Islam and Hinduism.**



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Subject: Pakistan Studies

Paper: GE-165

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

اس پرچہ کو مہیا کی گئی جوابی کاپی پر حل کریں۔

Q.1. Answer the following short questions.

(5X6=30)

سوال نمبر 1: مندرجہ ذیل سوالات کے مختصر جواب دیجئے۔

I. Aligarh Movement

I۔ تحریک علی گڑھ

II. Lahore Resolution

II۔ قرارداد لاہور

III. Objectives Resolution

III قرارداد مقاصد

IV. Culture of Pakistan

IV۔ پاکستانی ثقافت

V. Administrative Issues of Pakistan

V۔ پاکستان کے انتظامی مسائل

Answer the following questions.

(2x15=30)

مندرجہ ذیل سوالات کے جواب دیجئے۔

Q. No. 2. Highlight the Early difficulties faced by Pakistan.

سوال نمبر 2۔ پاکستان کو درپیش ابتدائی مشکلات کو اجاگر کریں۔

Q. No. 3. Discuss Pakistan's Geographical Significance.

سوال نمبر 3۔ پاکستان کی جغرافیائی اہمیت پر بحث کریں۔



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Paper: Pakistan Studies

Course Code: GEN-1002

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

Q.1. Answer the following short questions.

(5X6=30)

سوال نمبر 1: مندرجہ ذیل سوالات کے مختصر جواب دیجئے۔

I. Aligarh Movement

I۔ تحریک علی گڑھ

II. Nehru Report

II۔ نہرو رپورٹ

III. Bogra Formula

III بوگرہ فارمولا

IV. Salient features of 1956 Constitution

IV-1956 کے آئین کے نمایاں خدوخال

V. Z. A. Bhutto

V۔ زیڈ اے بھٹو

Answer the following questions.

(2x15=30)

مندرجہ ذیل سوالات کے جواب دیجئے۔

Q. No. 2. Describe the historical significance of Lahore Resolution.

سوال نمبر 2۔ قرار داد لاہور کی تاریخی اہمیت بیان کریں۔

Q. No. 3. Discuss Pakistan's geographical significance.

سوال نمبر 3۔ پاکستان کی جغرافیائی اہمیت پر بحث کریں۔



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Paper: Fundamentals of Geography

Course Code: GEOG-101

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

- i. Differentiate between spring and neap tides?
- ii. Enlist and explain different economic activities?
- iii. Explain the difference between the star and moon?
- iv. Define rocks? What are arenaceous rocks?
- v. What is the economic importance of Atlantic Ocean?
- vi. Explain ozone layer, its formation and role for supporting life?

**Answer the following questions. (3x10=30)**

Q2: Define population density? Explain different factors that affecting population distribution of the world?

Q3: Define Geography? Write in detail different branches of Human Geography?

Q4: Explain the configuration of ocean floor with the help of diagram?



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

اس پرچہ کو مہیا کی گئی جوابی کاپی پر حل کریں۔

سوال نمبر 1: درج ذیل سوالات کے مختصر جواب دیجئے۔ (6x5=30)

- 1۔ سنت اور حدیث کا معنی و مفہوم بیان کریں اور حدیث کی تین اقسام لکھئے۔
- 2۔ صحیح بخاری کا تعارف پیش کریں۔
- 3۔ سنت اور حدیث کی حجیت پر چھ دلائل دیجئے۔
- 4۔ "کتاب الزکوٰۃ" کا خلاصہ بیان کریں۔
- 5۔ حج کے احکام احاطہ تحریر میں لائیں۔
- 6۔ حدیث جبریل کی روشنی میں چار سوالات کے جواب تحریر کریں۔

سوال نمبر 2: مندرجہ ذیل سوالات کے جواب دیجئے۔

(10)

1۔ حدیث اور سنت کی اہمیت و ضرورت پر دلائل پیش کریں۔

(6+4=10)

2۔ درج ذیل حدیث کا ترجمہ و تشریح کریں۔

عَنْ عَبْدِ اللَّهِ بْنِ عَمْرٍو رَضِيَ اللَّهُ عَنْهُمَا، أَنَّ رَجُلًا سَأَلَ النَّبِيَّ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ: أَيُّ الْإِسْلَامِ خَيْرٌ؟ قَالَ: تُطْعِمُ الطَّعَامَ، وَتَقْرَأُ السَّلَامَ عَلَى مَنْ عَرَفْتَ وَمَنْ لَمْ تَعْرِفْ

(6+4=10)

3۔ درج ذیل حدیث کا ترجمہ و تشریح کریں۔

أَنَّسَ بْنَ مَالِكٍ، قَالَ: يَا أَبَا حَمْزَةَ، مَا يُحَرِّمُ دَمَ الْعَبْدِ وَمَالَهُ؟ فَقَالَ: «مَنْ شَهِدَ أَنْ لَا إِلَهَ إِلَّا اللَّهُ، وَاسْتَقْبَلَ قِبَلَتَنَا، وَصَلَّى صَلَاتَنَا، وَأَكَلَ ذَبِيحَتَنَا، فَهُوَ الْمُسْلِمُ، لَهُ مَا لِلْمُسْلِمِ، وَعَلَيْهِ مَا عَلَى الْمُسْلِمِ



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Solve the following:**

**(6x5=30)**

1. Evaluate  $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$ , when  $n$  tends to infinity through positive integral values only.

2. Show that if  $f$  is continuous at a point  $a$ , then  $|f|$  is also continuous there.

3. Let  $f(x) = x^2$ ,  $g(x) = x^3$ . Verify Cauchy's mean value theorem on  $[1, 2]$ . Also, find  $c$ .

4. Evaluate the integral  $\int_1^{\infty} \frac{dx}{x}$ .

5. Evaluate the integral  $\int_0^6 f(x) dx$ , where  $f(x) = \begin{cases} x^2 & \text{if } x < 2 \\ 3x - 2 & \text{if } x \geq 2 \end{cases}$ .

6. Evaluate  $I = \int \arcsin x \, dx$ .

**Q.2. Solve the following:**

**(3x10=30)**

1. Let  $f(x) = \begin{cases} \sin 2x & \text{if } 0 < x \leq \frac{\pi}{6} \\ ax + b & \text{if } \frac{\pi}{6} < x \leq 1 \end{cases}$ . Derive the values of  $a$  and  $b$  so that  $f$  is continuous and differentiable at  $x = \frac{\pi}{6}$ .

2. Show that

$$\int x^n \arctan x \, dx = \frac{x^{n+1}}{n+1} \arctan x - \frac{1}{n+1} \int \frac{x^{n+1}}{1+x^2} dx.$$

Hence evaluate  $\int x^3 \arctan x \, dx$ .

3. Evaluate the integral  $\int (a^2 + x^2)^{\frac{3}{2}} dx$ .



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED****Q.1. Solve the following:****(6x5=30)**

- (i) Investigate whether the  $\lim_{x \rightarrow 1} \frac{\sqrt{2x}(x-1)}{|x-1|}$  exist or not.
- (ii) If  $x^y = e^{x-y}$  then prove that  $\frac{\ln x}{(1 + \ln x)^2}$ .
- (iii) Evaluate  $\int \sqrt{x} \cos^2(x^{\frac{3}{2}}) dx$ .
- (iv) Use Taylor 's Theorem to prove that  
 $\ln \sin(x+h) = \ln \sin x + h \cot x - \frac{1}{2}h^2 \csc^2 x + \frac{1}{3}h^3 \cot x \csc^2 x \dots$
- (v) Show that  $\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sin x + \cos x} dx = \frac{\pi}{4}$ .
- (vi) Find 4th roots of  $-16$ .

**Solve the following:****(5x6=30)****Q2. Evaluate  $\int \frac{1}{x^2 \sqrt{x^2 - 1}} dx$ .****Q3. Let  $f(x) = \begin{cases} x^2 & x \leq 1 \\ \sqrt{x} & x < 1 \end{cases}$** **Determine whether  $f$  is differentiable at  $x = 1$ . If so, find the value of derivative.****Q4. Use L' Hospital Rule to evaluate the  $\lim_{x \rightarrow \infty} \left(\frac{x+a}{x-a}\right)^x$ .****Q5. Solve the inequality  $|x^2 - x + 1| > 1$ .****Q6. Find the area of the region between the x-axis and the graph of  
 $f(x) = x^3 - x^2 - 2x$ .**



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Solve the following:**

**(6x5=30)**

- (i) If  $\vec{r} = \vec{a} \cos 2t + \vec{b} \sin 2t$ , where  $\vec{a}, \vec{b}$  are constant vectors, then show that  $\vec{r} \times \frac{d\vec{r}}{dt} = 2\vec{a} \times \vec{b}$ .
- (ii) Find the constants  $a$  and  $b$  so that the surface  $ax^2 + byz + (a+2)x$  will be orthogonal to the surface  $4x^2y + z^3 = 4$  at the point  $(1, -1, 2)$ .
- (iii) A force of 30 N is acting on a block makes angle of  $45^\circ$  with x-axis. Find its resolved parts along coordinate axes (x-axis and y-axis).
- (iv) State and prove  $(\lambda, \mu)$  theorem.
- (v) Show that the least force to drag a particle of mass  $m$  on a rough inclined plane of inclination  $\alpha$  is  $mgsin \alpha + \lambda$ , where  $\lambda$  is angle of friction.
- (vi) State and prove principle of virtual work for a set of rigid bodies.

**Q.2. Solve the following:**

- (a) Find the divergence and curl of the vector point function  $\vec{F} = (x^2 + yz)\hat{i} + (y^2 + zx)\hat{j} + (z^2 + xy)\hat{k}$  (7 marks)
- (b) Prove that the effect of a couple upon a rigid body is unaltered if it is replaced by any other couple of the same moment lying in the same plane. (7 marks)
- (c) A rod, 4 ft long, rests on a rough floor against the smooth edge of a table of height 3 ft. If the rod is on the point of slipping when inclined at an angle of  $60^\circ$  to the horizontal, find the coefficient of friction. (8 marks)
- (d) Six equal rods  $AB, BC, CD, DE, EF$  and  $FA$  are each of weight  $W$  and are freely jointed at their extremities so as to form a hexagon. The rod  $AB$  is fixed in a horizontal position and the middle points of  $AB$  and  $DE$  are joined by a string. Prove that its tension is  $3W$ . (8 marks)



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Solve the following:**

**(6x5=30)**

1. Solve for  $x$ ,  $\frac{2x-5}{x-2} < 1$ .
2. Show that for  $z \in C$  (Set of Complex Numbers),  $z^2 + \bar{z}^2$  is a real number.
3. Find the cube root of 8.
4. If  $x - 1$ ,  $x + 1$  and  $x + 4$  are the first three terms of a Geometric Progression(G.P.), find the 5<sup>th</sup> term of G.P.
5. What is the circular measure of the angle between the hands of a watch at 4 O'clock?
6. If  $A = \begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix}$ , and  $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ , find the values of  $a$ , and  $b$ .

**Q.2. Solve the following:**

**(3x10=30)**

1. The first, third and ninth terms of an A.P. with common difference 2 are the first three terms of a geometric series, find the sum of the first seven terms of the geometric series.
2. Use Mathematical induction to prove that:
$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \dots + \frac{1}{n \times (n+1)} = 1 - \frac{1}{n+1}.$$
3. If  $\alpha, \beta, \gamma$  are the angles of a triangle ABC, show that
$$\cot \frac{\alpha}{2} + \cot \frac{\beta}{2} + \cot \frac{\gamma}{2} = \cot \frac{\alpha}{2} \cot \frac{\beta}{2} + \cot \frac{\beta}{2} \cot \frac{\gamma}{2} + \cot \frac{\gamma}{2} \cot \frac{\alpha}{2}.$$



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Fundamentals Application of Algebra (Compulsory 3)

Course Code: MATH-115

Roll No. ....

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Solve the following:**

**(6x5=30)**

(i)	Simplify and separate into real and imaginary parts $\frac{1+4i}{3-7i}$
(ii)	Prove that $\begin{vmatrix} a+b & c & 1 \\ b+c & a & 1 \\ c+a & b & 1 \end{vmatrix} = 0$
(iii)	Solve $\frac{1}{x+3} + \frac{2}{x-7} = 1$ , $x \neq -3, 7$ .
(iv)	Show that the roots of equation $2x^2 + (mx-1)^2 = 3$ are equal if $3m^2 + 4 = 0$ .
(v)	Find the sum of the first 15 terms of the arithmetic series $3+7+11+\dots$ .
(vi)	Find the term involving $x^4$ in the expansion of $(2x+3)^5$ .

**Q.2. Solve the following:**

**(5x6=30)**

(a)	Solve the system of linear equations $2x - y - z = 4$ $3x + 4y - 2z = 11$ $3x - 2y + 4z = 11$
(b)	If possible, find the inverse of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 0 & -2 & 0 \\ -2 & -2 & 2 \end{bmatrix}$
(c)	Solve $\sqrt{2x+8} + \sqrt{x+5} = 7$
(d)	Prove that $\begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix} = \begin{vmatrix} b^2+c^2 & ab & ac \\ ba & a^2+c^2 & bc \\ ca & cb & b^2+a^2 \end{vmatrix}$
(e)	Prove the identity $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

#### Q.1. Solve the following questions.

(10x3=30)

1. From suitable properties of union and intersection deduce the following

$$A \cap (A \cup B) = A \cup (A \cap B)$$

2. Let  $f(x) = \begin{cases} x-1, & x < 3 \\ 2x+1, & 3 \leq x. \end{cases}$

Find domain and range of  $f$ .

3. Given  $f(x) = x^3 - ax^2 + bx + 1$ . If  $f(2) = -3$  and  $f(1) = 0$ . Find the values of  $a$  and  $b$ .

4. Evaluate  $\lim_{\theta \rightarrow 0} \frac{1 - \cos 2\theta}{\theta^2}$ .

5. Draw the graph of  $f(x) = \sqrt{x+1}$ .

6. Find  $x$  and  $y$  if  $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2 \end{bmatrix}$ .

7. Show that  $\begin{vmatrix} a & b+c & a+b \\ b & c+a & c+b \\ c & a+b & c+a \end{vmatrix} = a^3 + b^3 + c^3 - 3abc$ .

8. Find the inverse of  $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & -2 & 0 \\ -2 & -2 & 2 \end{bmatrix}$ .

9. Show that  $\sin\left(\frac{3\pi}{2} + \theta\right) = -\cos \theta$ .

10. Find the centre and radius of the circle having equation,

$$5x^2 + 5y^2 + 14x + 12y - 10 = 0$$

#### Q.2. Solve the following questions.

(5x6=30)

1. Prove that  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ .

2. Find the centre, foci, eccentricity, vertices, and directrices of the ellipse whose equation is  $\frac{(2x-1)^2}{4} + \frac{(y+2)^2}{16} = 1$ .

3. Solve the system of linear equations by Cramer's rule.

$$2x_1 - x_2 + x_3 = 5$$

$$4x_1 + 2x_2 + 3x_3 = 8$$

$$3x_1 - 4x_2 - x_3 = 3$$

4. Show that  $\sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$ .

5. Let  $f(x) = \begin{cases} 3x, & \text{if } x \leq -2 \\ x^2 - 1, & \text{if } -2 < x < 2 \\ 3, & \text{if } x \geq 2. \end{cases}$

Discuss the continuity at  $x = 2$  and  $x = -2$ .



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions.**

**(15x2=30)**

1. State an example that charge is conserved.
2. Draw the electric field due to an electric dipole.
3. Give the statement and mathematical expression of Gauss's law.
4. What is the electric potential energy between two charges **a** and **b** placed at distance **r**.
5. Calculate the potential at distance **r** from the charge, if  $q=1.5\text{nC}$  and  $r=1\text{cm}$ .
6. How the electric resistance and resistivity are related to each other.
7. Does magnetic field exert force on a current carrying wire?
8. What is a solenoid.
9. Write the factors on which motional emf depends.
10. Define total internal reflection.
11. Have you ever seen the soap bubbles and their colorful patterns? Give the reason behind these.
12. What are the polarizing filters?
13. Give the formula for refractive index.
14. Calculate the electric dipole moment of a proton and electron at 2.3nm distance apart.
15. Describe briefly "charge is quantized".

**Solve the following questions.**

**Question 2.**

**(5+5=10)**

- (a) Define Electric potential and electric potential energy. Take two like charges,  $q_1$  is at the origin and  $q_2$  at point **a** ( at distance  $r_a$  from origin) , derive the expression for change in electric potential energy if  $q_2$  moves away to point **b** ( $r_b$ ) under the influence of electrostatic force **F** exerted by  $q_1$ .
- (b) If an electron is moving in electric field ( $6.0 \times 10^6 \text{ N C}^{-1}$ ) and magnetic field (0.83T) such that total force is zero. What is the velocity of electron?

**Question 3.**

**(5+5=10)**

- (a) Derive the expression for the electric force due to a ring of positive charge **q**, placed along the **z**- axis at distance **z** from the test charge.
- (b) Suppose that we have  $2.10 \times 10^8$  doubly charged positive ions per cubic centimeter, all moving north with a speed of  $1.40 \times 10^5 \text{ m/s}$ . Calculate the current density in magnitude and direction.

**Question 4.**

**(5+5=10)**

- (a) Define diffraction, give its example. Explain double slit diffraction in detail.
- (b) Suppose you pass light from a He-Ne laser through two slits separated by 0.0100 mm and find that the third bright line on a screen is formed at an angle of  $10.95^\circ$  relative to the incident beam. What is the wavelength of the light?



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

**Q.1. Solve the following:**

(6x5=30)

- Consider a Little League team that has 15 players on its roster. How many ways are there to select 9 players for the starting lineup?
- It is known that 30% of a certain company's washing machines require service while under warranty, whereas only 10% of its dryers need such service. If someone purchases both a washer and a dryer made by this company, what is the probability that both machines need warranty service?
- The random variable  $X$ , representing the number of cherries in a cherry puff, has the following probability distribution:

$X$	4	5	6	7
$P(X = x)$	0.2	0.4	0.3	0.1

Find the mean  $\mu_{\bar{X}}$ , and the variance  $\sigma^2_{\bar{X}}$  of the mean  $\bar{X}$  for random samples of 36 cherry puffs?

- Find the probability of getting two heads when five coins are tossed.
- The joint p.d.f of  $(X, Y)$  is given by  $f(X, Y) = \begin{cases} \frac{1}{4}(1 + xy), & |x| < 1, |y| < 1 \\ 0, & \text{otherwise} \end{cases}$ . Show that  $X$  and  $Y$  are not independent?
- The sum of 10 values is 100 and the sum of their squares is 1090. Find out the coefficient of variation?

**Solve the following.**

(3x10=30)

**Q.2.**

A maker of a certain brand of low-fat cereal bars claims that their average saturated fat content is 0.5 gram. In a random sample of 8 cereal bars of this brand the saturated fat. Content was 0.6, 0.7, 0.7, 0.3, 0.4, 0.5, 0.4, and 0.2. Would you agree with the claim? Assume a normal distribution.

**Q.3.**

Only 1 in 1000 adults is afflicted with a rare disease for which a diagnostic test has been developed. The test is such that when an individual actually has the disease, a positive result will occur 99% of the time, whereas an individual without the disease will show a positive test result only 2% of the time. If a randomly selected individual is tested and the result is positive, what is the probability that the individual has the disease?

**Q.4.**

The accompanying data on  $x$  = current density ( $\text{mA}/\text{cm}^2$ ) and  $y$  = rate of deposition ( $\mu\text{m}/\text{min}$ ) appeared in the article "Plating of 60/40 Tin/Lead Solder for Head Termination Metallurgy" (Plating and Surface Finishing, Jan. 1997: 38–40). Do you agree with the claim by the article's author that "a linear relationship was obtained from the tin-lead rate of deposition as a function of current density"? Explain your reasoning.

$x$	20	40	60	80
$y$	0.24	1.20	1.71	2.22

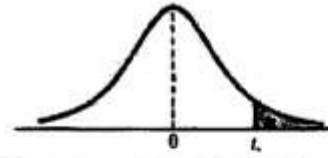


Table A.4 Critical Values of the *t*-Distribution

<i>v</i>	$\alpha$						
	0.40	0.30	0.20	0.15	0.10	0.05	0.025
1	0.325	0.727	1.376	1.963	3.078	6.314	12.706
2	0.289	0.617	1.061	1.386	1.886	2.920	4.303
3	0.277	0.584	0.978	1.250	1.638	2.353	3.182
4	0.271	0.569	0.941	1.190	1.533	2.132	2.776
5	0.267	0.559	0.920	1.156	1.476	2.015	2.571
6	0.265	0.553	0.906	1.134	1.440	1.943	2.447
7	0.263	0.549	0.896	1.119	1.415	1.895	2.365
8	0.262	0.546	0.889	1.108	1.397	1.860	2.306
9	0.261	0.543	0.883	1.100	1.383	1.833	2.262
10	0.260	0.542	0.879	1.093	1.372	1.812	2.228
11	0.260	0.540	0.876	1.088	1.363	1.796	2.201
12	0.259	0.539	0.873	1.083	1.356	1.782	2.179
13	0.259	0.538	0.870	1.079	1.350	1.771	2.160
14	0.258	0.537	0.868	1.076	1.345	1.761	2.145
15	0.258	0.536	0.866	1.074	1.341	1.753	2.131
16	0.258	0.535	0.865	1.071	1.337	1.746	2.120
17	0.257	0.534	0.863	1.069	1.333	1.740	2.110
18	0.257	0.534	0.862	1.067	1.330	1.734	2.101
19	0.257	0.533	0.861	1.066	1.328	1.729	2.093
20	0.257	0.533	0.860	1.064	1.325	1.725	2.086
21	0.257	0.532	0.859	1.063	1.323	1.721	2.080
22	0.256	0.532	0.858	1.061	1.321	1.717	2.074
23	0.256	0.532	0.858	1.060	1.319	1.714	2.069
24	0.256	0.531	0.857	1.059	1.318	1.711	2.064
25	0.256	0.531	0.856	1.058	1.316	1.708	2.060
26	0.256	0.531	0.856	1.058	1.315	1.706	2.056
27	0.256	0.531	0.855	1.057	1.314	1.703	2.052
28	0.256	0.530	0.855	1.056	1.313	1.701	2.048
29	0.256	0.530	0.854	1.055	1.311	1.699	2.045
30	0.256	0.530	0.854	1.055	1.310	1.697	2.042
40	0.255	0.529	0.851	1.050	1.303	1.684	2.021
60	0.254	0.527	0.848	1.045	1.296	1.671	2.000
120	0.254	0.526	0.845	1.041	1.289	1.658	1.980
$\infty$	0.253	0.524	0.842	1.036	1.282	1.645	1.960



**Table A.4 (continued) Critical Values of the t-Distribution**

$\nu$	$\alpha$						
	0.02	0.015	0.01	0.0075	0.005	0.0025	0.0005
1	15.894	21.205	31.821	42.433	63.656	127.321	636.578
2	4.849	5.643	6.965	8.073	9.925	14.089	31.600
3	3.482	3.896	4.541	5.047	5.841	7.453	12.924
4	2.999	3.298	3.747	4.088	4.604	5.598	8.610
5	2.757	3.003	3.365	3.634	4.032	4.773	6.869
6	2.612	2.829	3.143	3.372	3.707	4.317	5.959
7	2.517	2.715	2.998	3.203	3.499	4.029	5.408
8	2.449	2.634	2.896	3.085	3.355	3.833	5.041
9	2.398	2.574	2.821	2.998	3.250	3.690	4.781
10	2.359	2.527	2.764	2.932	3.169	3.581	4.587
11	2.328	2.491	2.718	2.879	3.106	3.497	4.437
12	2.303	2.461	2.681	2.836	3.055	3.428	4.318
13	2.282	2.436	2.650	2.801	3.012	3.372	4.221
14	2.264	2.415	2.624	2.771	2.977	3.326	4.140
15	2.249	2.397	2.602	2.746	2.947	3.286	4.073
16	2.235	2.382	2.583	2.724	2.921	3.252	4.015
17	2.224	2.368	2.567	2.706	2.898	3.222	3.965
18	2.214	2.356	2.552	2.689	2.878	3.197	3.922
19	2.205	2.346	2.539	2.674	2.861	3.174	3.883
20	2.197	2.336	2.528	2.661	2.845	3.153	3.850
21	2.189	2.328	2.518	2.649	2.831	3.135	3.819
22	2.183	2.320	2.508	2.639	2.819	3.119	3.792
23	2.177	2.313	2.500	2.629	2.807	3.104	3.768
24	2.172	2.307	2.492	2.620	2.797	3.091	3.745
25	2.167	2.301	2.485	2.612	2.787	3.078	3.725
26	2.162	2.296	2.479	2.605	2.779	3.067	3.707
27	2.158	2.291	2.473	2.598	2.771	3.057	3.689
28	2.154	2.286	2.467	2.592	2.763	3.047	3.674
29	2.150	2.282	2.462	2.586	2.756	3.038	3.660
30	2.147	2.278	2.457	2.581	2.750	3.030	3.646
40	2.123	2.250	2.423	2.542	2.704	2.971	3.551
60	2.099	2.223	2.390	2.504	2.660	2.915	3.460
120	2.076	2.196	2.358	2.468	2.617	2.860	3.373
$\infty$	2.054	2.170	2.326	2.432	2.576	2.807	3.290



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Subject: Calculus and Analytical Geometry

Paper: MS-152 A

Roll No. ....

Time: 3 Hrs.

Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Solve the following:**

**(6x5=30)**

- (i) Find the limit of  $\lim_{x \rightarrow +\infty} \frac{3x+5}{6x-8}$ .
- (ii) Solve  $\frac{e^x - e^{-x}}{2} = 1$  for  $x$ .
- (iii) Find  $f'(x)$ , if  $f(x) = (x + \csc(x^3 + 3))^{-3}$ .
- (iv) Find slope and equation of tangent line of the function  $f(x) = x^2 - 3$ ,  $(2, 1)$ .
- (v) Evaluate the integral  $\int_{-1}^2 |2x - 3| dx$ .
- (vi) Find the equation of the plane that passes through the given points,  $(-2, 1, 1)$ ,  $(0, 2, 3)$  and  $(1, 0, -1)$ .

**Q.2. Solve the following.**

**(3x10=30)**

- (i) State and prove mean value theorem.
- (ii) Evaluate the integral by using the given substitution,  $\int_{\pi/3}^{\pi/2} \sin \sqrt{1 - 4 \cos^2 \theta} d\theta$ ,  $u = 2 \cos \theta$ .
- (iii) Find equation of the plane through the given points,  $P_1(1, 2, -1)$ ,  $P_2(2, 3, 1)$  and  $P_3(3, -1, 2)$ .



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions.**

**(15x2=30)**

1. What is meant by a vector quantity? Give examples.
2. What type of knowledge is discussed in electro-mechanics?
3. Differentiate between optimism and hydrodynamics.
4. What is meant by superconductivity?
5. State different types of vectors?
6. What is meant by addition of vectors?
7. What is meant by equilibrium?
8. What is meant by speed? Write its units.
9. Differentiate between velocity and momentum.
10. State Newton's second law of motion.
11. Write down second equation of motion by explaining all the terms used.
12. Define angular velocity and write its units.
13. State Stoke's law for viscous medium.
14. What is meant by terminal velocity? Write down its formula.
15. What do you know about fluid flow?

**Answer the following questions.**

**(3x10=30)**

**Q.2:** (a)-State and explain different conditions of equilibrium.

(b)-State and explain Newton's first and third laws of motion. (05 + 05)

**Q.3:-**Define centripetal force. Find a relation for centripetal force in form: (10)

$$F = \frac{mv^2}{r}$$

**Q.4:** (a)-Derive a relation between linear and angular accelerations. (05 + 05)

(b)-A train slows down from 40m/s with a uniform retardation of 2 m/s<sup>2</sup>. How long will it take to attain a speed of 20m/s?



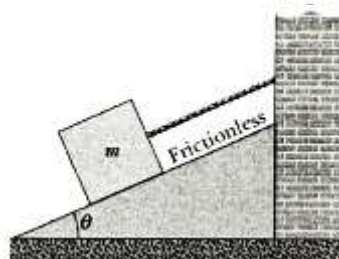
### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

**Q.1. Answer the following short questions. (15x2=30)**

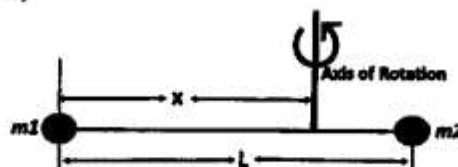
- i. What is the angle between two vectors  $A$  and  $B$  if  $A=3.0i - 4.0j$   $B=-2.0i+3.0k$
- ii. Define static equilibrium? Give an example.
- iii. State Kepler's law of orbits.
- iv. What do you mean by escape velocity?
- v. Differentiate between static friction and kinetic friction using graph?
- vi. What is difference between elastic and inelastic Collision?
- vii. How would you calculate the angular momentum of system of particles?
- viii. What does normal force mean?
- ix. A container with mass of 5kg is lifted to a height of 8m. How much work is done by the external force?
- x. Write Newton's second Law in angular form.
- xi. What is Free-body diagram?
- xii. What does conservation of mechanical energy mean?
- xiii. What is the relationship between linear and angular acceleration?
- xiv. What is Coriolis effect?
- xv. A body of mass 3g is dropped from rest at a height of 20m above surface of earth. What will be its speed just before it strikes the ground?

**Answer the following questions.**

- Q. 2. (i)** When work is done on a system by external force with friction involved. Relate that work to the changes in kinetic energy, potential energy and thermal energy. **(5 Marks)**
- (ii)** In given fig. let the mass of the block be 8.5 kg and the angle  $\theta$  be  $30^\circ$ . Find (a) the tension in the cord and (b) the normal force acting on the block. (c) If the cord is cut, find the magnitude of the resulting acceleration of the block. **(5 Marks)**



- Q3. (i)** For an isolated system in which only conservative forces act, apply the conservation of mechanical energy to relate the initial potential and kinetic energies to the potential and kinetic energies at a later instant. **(5 Marks)**
- (ii)** The object shown in figure consists of two particles, of masses  $m_1$  and  $m_2$ , connected by a light rigid rod of length  $L$  and negligible mass. (a) Find the rotational inertia  $I$  of this system for rotations of this object about an axis perpendicular to the rod and a distance  $x$  from  $m_1$ . (b) Show that  $I$  is a minimum when  $x=x_{cm}$  **(5 Marks)**



- Q4. (a)** State and prove Kepler's law of periods of planetary motion. **(5 Marks)**
- (b)** Explain in detail how smooth rolling can be considered as a combination of pure translation and pure rotation. **(5 Marks)**



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(6x5=30)**

- a) What is harmonic oscillator? Give mathematical and graphical explanations in term of restoring force of an idealized spring obeying Hook's law.
- b) Derive the expressions for displacement, velocity, acceleration, amplitude and phase angle in simple harmonic motion (SHM).
- c) Differentiate various types of damping. Also highlight the effect of periodic driving force on the damped oscillations.
- d) Discuss refraction of light using Fermat's principle.
- e) Discuss electromagnetic energy flow. Also derive an expression for electromagnetic energy flow in vacuum.
- f) Briefly describe the following terms:  
(i) group velocity (ii) phase velocity (iii) coherence (iv) travelling waves (v) standing waves.

**Q.2. Answer the following questions.**

**(3x10=30)**

- a) Find the expression for intensity in two-source interference. Also derive a condition for maximum intensity
- b) Explain Doppler effect of sound by discussing various cases of relative motions of source and listener.
- c) Using double refraction, derive lensmaker's equation for a thin lens.





**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Write short answers to the following: (5x4=20)**

- 1) Give difference between transitive and intransitive verbs give examples.
- 2) What is optative sentence and give examples.
- 3) What is conjunction and give example.
- 4) What is oral presentation?
- 5) Name at least 5 parts of speech
- 6) Define articles.

**Q.2. Change the following from active voice sentences into passive voice sentences. (5x2=10)**

1. She took the letter to the post office.
2. Jamil wrote these letters yesterday.
3. Does the teacher help you?
4. Get a new suit.
5. He has invited my guest.

**Q.3. Write a paragraph. (120 – 150 words) on any ONE of the following topics. (15)**

- 1) My life as I shall like it to be.
- 2) Friendship goals.
- 3) Money can't buy happiness.
- 4) My favourite author.

**Q.4. Read the following passage and answer the following questions given below. (3x5=15)**

The man who is perpetually hesitating, which of the two things he will do first, will do neither. The friend who resolves but suffers his resolution to be changed by the first counter suggestion of friend, - who fluctuates from opinion to opinion, veers like a weathercock to every point of the compass, with every breath of caprice that blows - can never accomplish anything great or useful. Instead of being progressive in anything, he will be best stationary and more probably retrograde in all. It is only the man who first consults wisely, that resolves firmly, and then executes his purpose with inflexible perseverance, undismayed by those petty difficulties that daunt a weaker spirit, - that can advance eminence in any line. Take your course wisely but firmly, and if after having taken it, you hold on to it with heroic resolution, even the Alps and Pyrenees will into significance before you.

**Questions:**

- 1) What does a hesitant man suffers from?
- 2) Does a hesitant person lacks confidence?
- 3) Make "précis" of the passage.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Paper: Islamic Studies

Course Code: PS-101

Roll No. ....

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

(6x5=30)

سوال نمبر 1: درج ذیل سوالات کے جواب تحریر کریں۔

1. تلاوتِ قرآن مجید کے پانچ آداب لکھیں ؟
2. حدیث کے مطابق دنیا اور آخرت کی بھلائی کن چار چیزوں میں رکھی ہے ؟
3. السبع الموبقات سے کیا مراد ہے اور السبع الموبقات کے نام لکھیں ؟
4. حلف الفضول سے کیا مراد ہے اور اس کی اہمیت کے بارے میں نبی ﷺ نے کیا فرمایا ؟
5. پانچ اولیات عمر رضی اللہ عنہ لکھیں ؟
6. اجماع کا لغوی اور اصطلاحی معنی اور اس کی اقسام کا مفہوم لکھیں ؟

(3x10=30)

درج ذیل سوالات کے جواب تحریر کریں۔

سوال نمبر 2: مندرجہ ذیل حدیث کا ترجمہ اور تشریح لکھیں ؟

عن النُّعْمَانِ بْنِ بَشِيرٍ، يَقُولُ: قَالَ رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ: «مَرَى الْمُؤْمِنِينَ فِي تَرَاحِمِهِمْ وَتَوَادِهِمْ وَتَعَاطُفِهِمْ، قَمَلٌ الْجَسَدِ، إِذَا اشْتَكَى عُضْوًا تَدَاعَى لَهُ سَائِرُ جَسَدِهِ بِالسَّهْرِ وَالْحُمَى»

سوال نمبر 3: خطبہ حجۃ الوداع کے اہم نکات اور اس کی اہمیت پر مفصل نوٹ لکھیں ؟

سوال نمبر 4: فقہ اسلامی کے ماخذ بیان کرتے ہوئے فقہ اسلامی کے بنیادی ماخذ پر مفصل نوٹ لکھیں ؟

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED****Q.1. Solve the following:****(6x5=30)**

- (i) If  $Y = \{-2, 1, 2\}$ , then make two binary relations for  $Y \times Y$ .
- (ii) Express the following decimals in the form  $\frac{p}{q}$ ,  $p, q \in \mathbb{Z}$ ,  $q \neq 0$ ,  $0.\overline{23}$ .
- (iii) Simplify and write the answer in the form  $a + ib$ :
- $$\frac{4 + 5i}{4 - 5i}$$
- (iv) If in an arithmetic progression,  $a_5 = 13$  and  $a_{17} = 49$ , find  $a_{13}$ .
- (v) Find three, consecutive numbers in geometric progression whose sum is 26 and their product is 216.
- (vi) Prove that:  $\tan x + \cot x = \sec x \csc x$ .

**Q.2. Solve the following:****(6x5=30)**

- (a) Use binomial theorem to evaluate  $(9.9)^5$ .
- (b) Find nature of the roots of equation  $x^2 - 23x + 120 = 0$  and verify the result by solving it.
- (c) Solve using Cramer's Rule:  $3x - 2y = -6$ ,  $5x - 2y = -10$ .
- (d) Find  $p$  if the sum of squares of the roots of the equation  $4x^2 + 3px + p^2 = 0$  is unity.
- (e) Prove that  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ .
- (f) Verify the trigonometric identity:  $\sec \theta - \cos \theta = \tan \theta \sin \theta$ .





**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Write short note on the following.**

**(5x6=30)**

سوال نمبر 1: درج ذیل پر مختصر نوٹ تحریر کیجئے۔

i. Two Nation Theory

(الف) دو قومی نظریہ

ii. Quaid-e-Azam

(ب) قائد اعظم

iii. Pirpur Report

(ج) پیر پور رپورٹ

iv. Legal Framework Order

(د) لیگل فریم ورک آرڈر

v. 8<sup>th</sup> Constitutional Amendment

(ه) آٹھویں آئینی ترمیم

**Q.2. Answer the following questions.**

**(2x15=30)**

سوال نمبر 2: درج ذیل سوالات کے تفصیلی جواب تحریر کیجئے۔

i. Explain the services of Sir Syed Ahmad Khan.

(الف) سر سید احمد خان کی خدمات بیان کریں۔

ii. Write a note on 1973 constitution.

(ب) 1973ء کے آئین پر نوٹ لکھیں۔



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Paper: Sociology-I

Course Code: SOC-101

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions. (6x5=30)**

- I. Differentiate between common sense knowledge and sociology?
- II. What is a relationship between sociology and psychology?
- III. What are the assumptions of structural functional perspective?
- IV. Differentiate between ethnocentrism and xeno-centrism?
- V. Explain role strain?
- VI. What are the types of crimes in Pakistan?

**Q.2. Answer the following questions. (3x10=30)**

- I. Explain language and symbols as elements of culture?
- II. How family socialize children?
- III. What are the methods of social control in Pakistan?



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Write short answers of the following questions. (6x5=30)**

- (i) Identify the fallacy, “*I can read Othello in a day. Tempset in a day. As you like it in a day. Merchant of Venice in a day. Therefore, I can read the whole work of Shakespeare in a day.*”
- (ii) What is material Truth.
- (iii) Write down the qualities of a critical thinker.
- (iv) Describe the function of language as evaluative.
- (v) With reference to the Traditional Square of Opposition discuss contraries.
- (vi) What is predictive arugment.

**Answer the following questions. (3x10=30)**

**Q.No.2: Write a comprehensive note on Quality, Quantity and Distribution.**

**Q.No.3: Discuss obversion as an immediate inference. Also state whether the obversion is logically equivalent or not?**

**Q.No.4 Determine whether the following symbolized arguments are valid or invalid by constructing a truth table.**

(A)  $[(P \cdot q) \supset r] \equiv [P \supset (q \supset r)]$

(B)  $K \equiv \sim L$   
 $\sim (L \cdot \sim K)$   
 $\therefore K \supset L$



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions.**

**(6x5=30)**

- 1. Explain the Fallacy of Undistributed Middle Term.**
- 2. Define Contraposition and Give Example.**
- 3. What is difference between mediate and immediate Inference?**
- 4. Define Major, Minor and Middle Terms with Examples.**
- 5. Define a Universal Affirmative Proposition with example.**
- 6. What is Verbal Dispute?**

**Q.2. Answer the following questions.**

**(3x10=30)**

- 1. Write a detail note on Deductive and Inductive Argument.**
- 2. Use Venn Diagram to test the Validity of Following Arguments.**

**(5+5)**

**a. EAE-4**

**b. IAI-3**

- 3. Draw the Traditional Square of Opposition and explain the relationships between Propositions.**



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

**Q.1. Answer the following short questions. (15x2=30)**

- (i) Define the term Parameter and Statistic.
- (ii) Define the term descriptive and inferential statistics.
- (iii) Define frequency distribution?
- (iv) Define the statistical term histogram and frequency polygon.
- (v) What is a measure of central tendency? What are its desirable qualities?
- (vi) Describe the empirical relation between the mean, median and mode.
- (vii) Define the term variance and standard deviation.
- (viii) The standard deviation of a symmetrical distribution is 8. Find its first four moments about mean.
- (ix) Differentiate between Fixed Base method and Chain Base Method.
- (x) Given  $\sum P_1q_0 = 9000$  and  $\sum P_0q_1 = 8850$ . find consumer price index number and write the name of the method.
- (xi) What is meant by correlation? Write down any two properties of correlation coefficient.
- (xii) Define rank correlation, which quantity is added to  $\sum d^2$  for tied ranks.
- (xiii) What is meant by coefficient of determination?
- (xiv) What are the main components of time series?
- (xv) Distinguish between the secular and seasonal variation in time series analysis.

**Solve the following questions.**

**Q:2 (a)** The sizes of shoes which are sold during 6 days of a week from a shop are given below.

6.5, 7.0, 8.5, 5.0, 6.5, 6.5, 7.5, 8.0, 5.5, 4.5,  
 5.0, 4.5, 4.5, 6.0, 6.5, 4.5, 6.0, 6.0, 6.5, 9.0  
 6.5, 5.5, 5.5, 8.5, 7.0, 7.5, 8.0, 6.5, 6.5, 7.0

Construct a stem-and-leaf display from the data in array. Also describe the model sizes of shoes.  
**(5+5=10)**

**(b)** Compute the mean and coefficient of variation from the following data:

Wages (In thousands)	No. of Employees
35 - 40	20
40 - 45	25
45 - 50	35
50 - 55	16
55 - 60	8
60 - 65	10

Q:3 (a) The following table shows the number of hours studied ( $X$ ) by a random sample of ten students and their grades in the examination ( $Y$ ). Calculate Spearman's rank correlation coefficient,  $r_s$ .

(5+5=10)

X	12	5	11	13	10	5	18	15	2	9
Y	58	44	79	72	70	54	94	85	33	68

(b) Calculate Fisher's Ideal index number from the following data taking 2020 as base year.

Commodity	2020		2021	
	Price	Quantity	Price	Quantity
A	46	98	54	96
B	35	21	38	28
C	60	17	62	21
D	80	19	75	20

Q:4. Find.

(4+6=10)

- (a) Trend values by 4-quarter moving averages.
- (b) Seasonal indices by ratio to moving averages.

Year	QUARTERS			
	I	II	III	IV
2018	74	102	92	106
2019	84	122	101	143
2020	94	141	128	160
2021	128	143	135	192



### THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

#### Q.1. Answer the following short questions: (6x5=30)

- a) Your college surveyed its students to determine average weekly time spent surfing the internet. From a random sample of 174 students the average time was computed to be 6.1 hours
- What is the population in this study?
  - Describe the sample
  - What is statistic?
  - Is the value 6.1 hours a parameter or a statistic?
- b) What is the difference between a histogram and a bar chart?
- c) Pakistan Bureau of statistics reported that the population of Pakistan increased from 132.4 million in 1998 to 241.5 million in 2023. Find the annual average growth rate using geometric mean.
- d) When a fixed number is added to each data value, what happens to
- The range and standard deviation
  - The coefficient of variation
- e) What is scatter diagram? What kind of the information does it provide?
- f) Differentiate between subjective probability and objective probability.

#### Solve the following questions.

(3x10=30)

#### Q.2

During COVID-19 millions of Pakistanis get up each morning and telecommute to work from offices in their home. Following is a sample of age data for individuals working at home

18 54 20 46 25 48 53 27 26 37 40 36 42  
37 39 38 23 66

- Compute the mean and mode
- The median age of the population of all adults is 35.5 years. Use the median age of the given data to comment on whether the at-home workers tend to be younger or older than the population of all adults
- Compute and interpret the first and third quartiles.

#### Q.3

A sales manager collected the following data on annual sales and years of experience

Experience(Years)	1	3	4	4	6	8	10	10	11	13
Annual Sales (\$1000s)	80	97	92	102	103	111	119	123	117	136

Compute and interpret the coefficient of correlation between years of experience and annual sales.

#### Q.4

A hamburger chain discovered that among their customers, 75% opt for mustard on their burgers, 80% prefer ketchup, and 65% enjoy using both condiments. Given a randomly selected customer, determine the probability that:

- The customer chooses to use either mustard, ketchup, or both.
- The customer neither use ketchup nor use mustard at all
- The customer chooses only mustard
- The customer chooses ketchup but not mustard



**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

- I. What is ecdysis?
- II. What is metamorphosis?
- III. What is multiple allele?
- IV. What is Down's syndrome?
- V. Write general characteristics of phylum Nemertea?
- VI. What is heterosis?

**Answer the following questions. (3x10=30)**

**Question: 2. Differentiate between Protostomes and Deuterostomes.**

**Question: 3. What is Metamerism? Describe its various advantages.**

**Question: 4. Write general characteristics of Phylum Porifera?**





**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions:**

**(6x5=30)**

- i. Define protozoans.
- ii. Describe the primary mode of nutrition in ciliates.
- iii. What are spicules, and what is their function in sponges?
- iv. Define radial symmetry and name one group of organisms that exhibit it.
- v. Describe the body plan of flatworms.
- vi. Which molluscan class is characterized by the presence of a shell?

**Answer the following questions.**

**(3x10=30)**

Question: 2 Describe the structure and function of coral reefs and discuss the impacts of environmental changes on these ecosystems.

Question: 3 Discuss the role of the coelom in the evolution of body plans among protostomes, using annelids and mollusks as examples.

Question: 4 Explain the ecological and economic importance of mollusks, providing examples from different classes.



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / First Semester – Spring 2025

Roll No. ....

Paper: Animal Diversity – I (Invertebrates)

Course Code: ZOOL-105

Time: 3 Hrs. Marks: 60

**THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED**

**Q.1. Answer the following short questions: (6x5=30)**

- i. Differentiate between peristomimum and prostomium?
- ii. Differentiate between prothorax, mesothorax and metathorax?
- iii. Differentiate between protostomes and deuterostomes?
- iv. Differentiate between endo and ecto parasites in invertebrates?
- v. Differentiate between food vacuole and contractile vacuole in protozoans?
- vi. What is tracheal system of tubules in arthropods?

**Answer the following questions. (3x10=30)**

**Question.2.** Discuss in detail canal system in Porifera?

**Question.3.** Describe the body wall and nematocysts in cnidarians?

**Question.4.** Discuss in detail excretory organs of invertebrates.