



UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Fourth Semester – Fall 2024

Roll No.

Paper: Introduction to Geography

(CLASH)

Course Code: GEOG-211

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 major themes of geography?
- 2) Describe the solar system and its main components.
- 3) What do you know about shape and size of the Earth?
- 4) What are time zones and why are they necessary?
- 5) Explain the difference between a plateau and a mountain.
- 6) What is the difference between terrestrial and aquatic biomes?

Q.2. Answer the following questions.

(3x10=30)

- 1) Write a comprehensive note on the structure of atmosphere.
- 2) Discuss the ocean currents of Atlantic Ocean.
- 3) Elaborate the difference between revolution and rotation. Also Explain the rotation related phenomenon.



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Q.1. Solve the following:

(6x5=30)

- i. Form the differential equation of which $y = x + 3e^{-x}$ is the solution.
- ii. Solve $\frac{dy}{dx} = 1 + x + y^2 + xy^2$
- iii. Solve $x dy - y dx = (x^2 + y^2)dx$
- iv. Solve $\frac{dy}{dx} = \frac{1}{e^y - x}$
- v. Solve $(D^3 - 6D^2 + 3D + 10)y = 0$
- vi. Determine whether the given functions are linearly independent or dependent on $(\infty, -\infty)$, $f_1(x) = e^x$, $f_2(x) = e^{-x}$, $f_3(x) = \sinh x$

Solve the following:

(5x6=30)

- Q2 Find the general solution of $(D^2 - 2D + 4)y = e^x \cos x$
- Q3 Find the general solution of $(x^2 D^2 - 3xD + 5)y = x^2 \sin(\ln x)$
- Q4 Solve $\frac{d^2 y}{dx^2} + y = \sec^3 x$
- Q5 Solve $\frac{d^2 y}{dx^2} + y = \tan x \sec x$
- Q6 Find the series solution of $(x^2 - 1)y'' + 4xy' + 2y = 0$ around the ordinary point $x = 0$



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Q.1. Briefly describe the following.

(15x2=30)

1. why muons reach the surface of the earth in greater numbers than would be predicted by classical physics?
2. Write down the physical implications of Lorentz transformation.
3. The wavelength of the sodium D1 line is 590nm. Calculate the energy difference in energy levels involved in the emission or absorption of this line.
4. Define the term Cooper pair.
5. What are the applications of superconductors?
6. Mention four characteristics of Laser.
7. What is the significance of metastable state in laser?
8. Write down the energy and momentum of massless particles.
9. What are the limitations of Bohr's atomic model?
10. Which of the ones has the highest ionization power, alpha or beta or gamma?
11. Differentiate between positron and beta particles.
12. Define the tunnelling effect.
13. Does the Pauli exclusion principle hold for the particle with integral spin?
14. How can we operate PN junction in reverse biasing?
15. How does a depletion region form in PN junction?

Answer the following questions

(3x10=30)

- Q2. Explain the ultraviolet catastrophe according to Rayleigh-Jeans distribution law. Show that Wien's law is a special case of Planck's Law.
- Q3. What role does magnetic quantum play in space quantisation of angular momentum? Show that the Z-component of L is quantised. What prohibits the angular momentum vector L from having a definite direction? Discuss the space quantisation of angular momentum clearly explaining the meaning of quantisation of its magnitude and direction. Show the precession of the L and Z-axis.
- Q4. What is a fission chain reaction? what are the components of a nuclear reactor? Discuss the working mechanism of a nuclear reactor based on a fission chain reaction.