

UG-648

**BMS-13/
BPHYA-01**

**B.Sc. DEGREE EXAMINATION —
JUNE, 2018.**

First Year

Mathematics

DIFFERENTIAL EQUATIONS

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Solve : $\frac{dy}{dx} + y \cot x = \sin 2x$.

2. Solve : $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 0$.

3. Solve : $\frac{dx}{y^2} = \frac{dy}{-xy} = \frac{dz}{x(z-2y)}$.

4. Solve : $p + q = \sin x + \sin y$.

5. Solve : $p^2z^2 + q^2 = 1$.

6. Find $L\left(\frac{e^{3t} - e^{-2t}}{t}\right)$.
7. Show that $L(e^{-at}f(t)) = F(s + a)$ where $F(s) = L(f(t))$.
8. Find the particular integral to $(D^2 - 4D - 12)y = \sin x \sin 2x$.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Solve : $xy p^2 + (x + y)p + 1 = 0$.
10. Solve : $(D^2 - 4D + 3)y = x^3 e^{2x}$.
11. Solve by method of variation of parameters $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$.
12. Solve $(mz - ny) dx + (nx - lz) dy + (ly - mx) dz = 0$.
13. Solve $(y^3x - 2x^4)p + (2y^4 - x^3y)q = qz(x^3 - y^3)$.

14. Solve $\frac{dx}{dt} = 2x - 3y$, $\frac{dy}{dt} = y - 2x$ using laplace transforms given that $x(0) = 8$, $y(0) = 3$.
15. Solve : $(p^2 + q^2)y = qz$.
16. Solve : $(x^2D^2 - 2xD - 4)y = x^2 + 2 \log x$.
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BPHY-11

B.Sc. DEGREE EXAMINATION –
JUNE, 2018.

First Year

Physics

MECHANICS, PROPERTIES OF MATTER
AND SOUND

Time : 3 hours

Maximum marks : 75

PART A — ($5 \times 3 = 15$ marks)

Answer ALL questions.

1. State and explain the law of conservation of linear momentum.
2. State Kepler's laws of planetary motion.
3. Find the energy stored in a wire of 5 m long and 10^{-2} m in diameter when it is stretched through 3×10^{-3} m by a load. Youngs modulus of material is 2×10^{11} N/m².

4. Water flows through a horizontal tube of length 0.2 m and internal radius is 8.1×10^{-4} m, under a constant load of the liquid 0.2 m high. In 12 minutes 8.64×10^{-4} m³ of liquid issues from the tube. Calculate the coefficient of viscosity of water. (Density of water = 1000 kg m^{-3} , $g = 9.81 \text{ ms}^{-2}$).
5. Write down the properties of simple Harmonic motion.

PART B — ($5 \times 12 = 60$ marks)

Answer ALL questions.

6. (a) Show that the path of a projectile is parabola.

Or

- (b) Find the velocities and direction of the smooth spheres after oblique impact.

7. (a) Describe how you can calculate G using boys method.

Or

- (b) Calculate the Gravitational field at a point due to spherical shell.

8. (a) Explain with necessary theory, how you can determine the rigidity modulus of a wire using torsion pendulum.

Or

- (b) Derive an expression for the bending of a bar supported at two ends and loaded in the middle. Describe the experiment to determine 'E' by bending.
9. (a) Derive the Poiseville's formula for the rate of flow of a liquid through a capillary tube. Describe laboratory method for determining the coefficient of viscosity of a liquid at room temperature.

Or

- (b) State and explain Bernoulli's theorem. Also explain how you can measure the amount of flow of liquid in a pipe using venturi meter.
10. (a) Determine the frequency of a tuning fork using Melde's string experiment.

Or

- (b) Explain the properties and applications of ultrasonics.

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BPHY-12

**B.Sc. DEGREE EXAMINATION —
JUNE 2018.**

First Year

OPTICS AND SPECTROSCOPY

Time : 3 hours

Maximum marks : 75

PART A — (5 × 3 = 15 marks)

Answer ALL questions.

1. Write the different methods to minimize spherical aberration.
2. Write the condition for dark and bright fringes due to interference.
3. Define the resolving power of a microscope.
4. State Brewster's law.
5. What is Raman effect?

PART B — (5 × 12 = 60 marks)

Answer ALL questions.

6. (a) Describe with theory the construction of Huygen's eyepiece.

Or

- (b) Explain how two narrow angled prisms of different dispersive powers may be combined to produce dispersion without deviation and deviation without dispersion.

7. (a) Describe the construction and working of a Michelson interferometer.

Or

- (b) Explain how will you determine the thickness of a thin wire using air wedge with necessary theory.

8. (a) Give the theory of zone plate.

Or

- (b) Discuss the phenomenon of Fraunhofer diffraction at a single slit.

9. (a) Describe the construction and working of a Laurent's half shade polarimeter.

Or

- (b) Explain the construction, action, limitation and uses of nicol prism.

10. (a) Derive the two Einstein's coefficients.

Or

- (b) Explain the construction and working of a semiconductor laser.
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