



RAN-1147

T.Y.B.Sc. (Sem-VI) Examination

March / April - 2019

Physics : Paper-VI

Mechanics and Mathematical Method

[Total Marks: 50

सूचना : / Instructions

नीचे दशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लभवी.
Fill up strictly the details of signs on your answer book

Name of the Examination:

T.Y.B.Sc. (Sem-VI)

Name of the Subject :

Physics : Paper-VI

Subject Code No.: 1 1 4 7

Seat No.:

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Student's Signature

Instruction:

- (1) Draw neat diagrams wherever necessary.
- (2) Symbols used in the paper have their usual meaning.
- (3) Figures to the right indicate full marks of the question.
- (4) Scientific calculator may be used.

1. Answer the following questions in brief:

(08)

- [1] Represent the addition of a complex number to its complex conjugate yields twice of the real part of the quantity.
- [2] What is the modulus of $\frac{1-i}{1+i}$?
- [3] Define neighbourhood of a point
- [4] Which of the following term is an odd function ?
[a] $\cos x$ [b] x^4 [c] $x \cos x$ [d] x^2
- [5] What is the Newtonian principle of relativity.
- [6] Mention the relation of their principle moment of inertia for 'asymmetric top'
- [7] Write the unit of an angular momentum ?
- [8] What is nutation?

2. (a) **Attempt any one of the following in details:** (10)
- (i) Discuss rotating co-ordinate systems and obtain expression for effective force acting on a body accelerating in a uniformly rotating frame.
 - (ii) Obtain Euler's equation of motion for rigid body.
- (b) **Attempt any one of the following:** (04)
- (i) A body is falling freely from a height of 1km above the surface of the earth Calculate the time of flight and displacement due to coriolis force at the north pole.
 - (ii) 2 kg disc with a radius of 1 m rotates at a constant angular speed of 4 rad/s. What is the rotational kinetic energy of the disc ?
3. (a) **Attempt any one of the following in details** (10)
- (i) Explain geometrical representation of the sum, difference and product of the complex numbers.
 - (ii) Obtain Fourier series for $f(x) = x \sin x$ in the interval $-\pi < x < \pi$.
- (b) **Attempt any one of the following:** (04)
- (i) Prove that modulus of sum of two complex number does never exceed the sum of their moduli.
 - (ii) Determine the given function $f[z] = x + i xy^2$ is analytic or not at any point.
4. (a) **Attempt any two of the following in details:** (14)
- (i) Derive general expressions for rotational kinetic energy of a rigid body.
 - (ii) Write a note on Foucault pendulum.
 - (iii) State and prove the necessary condition for function to be an analytic.
 - (iv) Write a Fourier expansion of a function $f(x)$ as a summation of infinite sine and cosine terms. Obtain the expression for their coefficients.
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