1B3N18210 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

**Third Semester B.Sc Degree Examination, November 2018**

**BPHY3B03 - Mechanics**

(2016 Admission onwards)

Max. Time: 3 hours Max. Marks: 80

## Section A

**Answer all questions. Each question carries 1 mark**

1 Among the given list the Galilean invariant/s is/are .....
(coordinate, velocity, acceleration, length)

2 The expression for coriolis acceleration is .....(Given: m = mass, v = velocity with respect to an inertial frame, v′ = velocity with respect to a rotating frame, ω = angular velocity of the rotating frame, **a** = acceleration with respect to an inertial frame)

3 If **F** is a conservative force, we have ..... $(\nabla.\mathbf{F} = 0, \nabla\times\mathbf{F} = 0, \frac{\partial\mathbf{F}}{\partial t} = 0, \int_A^B \mathbf{F}.d\mathbf{l} = 0)$

4 Rocket works based on the .....
(Newton's law of gravitation, Newton's laws of motion, Special theory of relativity, Fermat's principle).

5 The expression for escape velocity in terms of mass and radius of the planet is.....

6 The imaginary component of space-time for vector is.....

7 The number of degree/s of freedom of a simple pendulum is .....

8 State work –energy theorem.

**State True/False**

9 A satellite's orbit is a position of stable equilibrium position with respect to the potential energy curve.

10 The proposed particle tachyons move with velocity greater than c.

**(10 × 1 = 10 Marks)**

## Section B

**Answer all questions. Each question carries 2 marks**

11 What is meant by fictitious force? Give an example.

12 State Kepler's three laws of planetary motion.

13 Write down D' Alembert's principle of virtual work.

14 Four identical particles are placed at (-2,-4,0), (2,4,0), (2,-2,0) and (-2,2,0). The coordinate of the centre of mass is.....

15 What are holonomic and non holonomic constraints?

16 What is length contraction? Give the expression.

17 Write the law of conservation of linear momentum for a system of interacting particles.

**(7 × 2 =14 Marks)**

1B3N18211 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

**Third Semester B.Sc Degree Examination, November 2018**

**BPHY3C03 - Optics, Laser, Electronics and Communication**

(2016 Admission onwards)

Max. Time: 3 hours Max. Marks: 64

**Section A (One Word)**
**Answer All Questions.**
**Each Question carries one mark**

1. Colors of thin films are due to .....
2. When reflected from a transparent medium, the angle of incidence for which the reflected light is completely polarized is called .....
3. Transistor works as an amplifier, when it operates under .....region.
4. In the diffraction of light of wavelength '$\lambda$' at a single slit of small width 'a', the angle '$\theta$' between first minima on either side of central maximum is .....
5. The relation between $\alpha$ and $\beta$ of transistor is .....
6. Which transistor configuration is commonly used for impedance matching?
7. A negation following an OR gate is .....
8. The active medium in Ruby Laser is .....
9. In an NPN transistor, the collector current is 10mA. If 90% of the electrons emitted reach the collector, the emitter current will be .....
10. Wavelength of a laser beam can be used as a standard of .....

**(10 x 1 = 10 Marks)**

**Section B (Short Answer Questions)**
**Answer all questions.**
**Each question carries 2 marks.**

11. What is meant by optical path? How is it related to phase of a light wave?
12. What is phase change on reflection?
13. What are half period zones? Why are they called so?
14. Give a brief description of double refraction.
15. What are the applications of polarization?
16. Explain zener diode as a voltage stabilizer.
17. What are metastable states? Why are they needed by a Lasing medium?

**(7 x 2 = 14 Marks)**

## Section C (Paragraph Questions)
**Answer any two questions**
**Each question carries 4 marks**

18. Deduce the laws of reflection from Fermat's principle.
19. What is a diffraction grating? Obtain the condition for getting principal maxima using a plane transmission grating in normal incidence.
20. Explain, with diagram, the working of a transistor amplifier.
21. Explain the working of He-Ne laser, drawing energy level diagram.
22. Distinguish between positive and negative crystals.

**(2 x 4 = 8 Marks)**

## Section D (Problems)
**Answer any three questions**
**Each question carries 4 marks**

23. In biprism experiment, 'a' is the distance between source and biprism, 'b' is the distance between biprism and screen and $\alpha$ is the base angle of biprism. Given that b/a=20 and for sodium light of wavelength 5893A°, a fringe width of 0.1cm is obtained. If the refractive index of the prism is 1.5, calculate the angle $\alpha$.
24. In Fraunhofer diffraction due to a single slit, a screen is placed 2m away from the lens to obtain the pattern. If the slit width is 0.2mm and first minima lie 5mm on either side of central maximum, find the wavelength of light.
25. On introducing a Polari meter 25cm long and containing sugar solution of unknown strength, it's found that the plane of polarization is rotated through 10°. Find the strength of sugar solution in $g/cm^3$. Given that the specific rotation of sugar solution is 60° per decimeter per unit concentration.
26. For a transistor in common emitter (CE) connection, the current amplification factor is 45 and the voltage drop across 1k$\Omega$ resistor which is connected in collector circuit is 1V. Find the base current and emitter current.
27. Calculate the operating frequency and feedback fraction of a Colpitt's oscillator with $C_1$=0.1$\mu$F, $C_2$=1$\mu$F and L=470$\mu$H.

**(3 x 4 = 12 Marks)**

## Section E (Essays)
**Answer any two questions**
**Each question carries 10marks**

28. Explain the formation of Newton's rings. Derive the expression to determine the refractive index of a transparent liquid using it in Newton's rings experiment.
29. Describe the diffraction of a cylindrical wave front at a straight edge. Draw the intensity distribution curve.
30. With the help of a neat diagram,explain the principle and working of full wave bridge rectifier. Show that the rectification efficiency of full wave rectifier is twice the efficiency of half wave rectifier.

**(2 x 10 = 20 Marks)**