

2020

PHYSICS (Honours)

Paper Code : II - A & B

[New Syllabus]

Important Instructions for Multiple Choice Question (MCQ)

- Write Subject Name and Code, Registration number, Session and Roll number in the space provided on the Answer Script.

Example : Such as for Paper III-A (MCQ) and III-B (Descriptive).

Subject Code :

III	A	&	B
-----	---	---	---

Subject Name :

- Candidates are required to attempt all questions (MCQ). Below each question, four alternatives are given [i.e. (A), (B), (C), (D)]. Only one of these alternatives is 'CORRECT' answer. The candidate has to write the Correct Alternative [i.e. (A)/(B)/(C)/(D)] against each Question No. in the Answer Script.

Example – If alternative A of 1 is correct, then write :

1. – A

- There is no negative marking for wrong answer.

মাল্টিপল চয়েস প্রশ্নের (MCQ) জন্য জরুরী নির্দেশাবলী

- উত্তরপত্রে নির্দেশিত স্থানে বিষয়ের (Subject) নাম এবং কোড, রেজিস্ট্রেশন নম্বর, সেশন এবং রোল নম্বর লিখতে হবে।

উদাহরণ — যেমন Paper III-A (MCQ) এবং III-B (Descriptive)।

Subject Code :

III	A	&	B
-----	---	---	---

Subject Name :

- পরীক্ষার্থীদের সবগুলি প্রশ্নের (MCQ) উত্তর দিতে হবে। প্রতিটি প্রশ্নে চারটি করে সম্ভাব্য উত্তর, যথাক্রমে (A), (B), (C) এবং (D) করে দেওয়া আছে। পরীক্ষার্থীকে তার উত্তরের স্বপক্ষে (A)/(B)/(C)/(D) সঠিক বিকল্পটিকে প্রশ্ন নম্বর উল্লেখসহ উত্তরপত্রে লিখতে হবে।

উদাহরণ — যদি 1 নম্বর প্রশ্নের সঠিক উত্তর A হয় তবে লিখতে হবে :

1. – A

- ভুল উত্তরের জন্য কোন নেগেটিভ মার্কিং নেই।

Paper Code : II - A

Full Marks : 15

Time : Thirty Minutes

Answer *all* the Questions.

Choose the Correct Answer.

Each Question Carries 1.5 Marks.

1. Which of the following is the fastest process of heat transfer?
 - (A) Conduction
 - (B) Convection
 - (C) Radiation
 - (D) all three

2. A cooking pot is coated black because —
 - (A) Black substances absorb more heat
 - (B) Black substances reflect more heat
 - (C) Black surfaces radiate more heats
 - (D) Above all

3. According to van der Waals' gas equation, critical co-efficient $\frac{RT_C}{P_C V_C}$ is equal to —
 - (A) 8
 - (B) 8.3
 - (C) 8/3
 - (D) 1

4. Viscosity of gas is due to the transport of —
- (A) Velocity
 - (B) Energy
 - (C) Mass
 - (D) Momentum
5. Which of the following is not an applications of Ultrasonic waves?
- (A) For measuring the depth of ocean
 - (B) In sterilizing of a liquid
 - (C) In ultrasonography
 - (D) In sterilizing a needle
6. Name the characteristic of the sound which distinguishes a sharp sound from a grave or dull sound?
- (A) Intensity
 - (B) Echo
 - (C) Pitch
 - (D) Resonance
7. Which of the following is blocked by a Capacitor?
- (A) A.C
 - (B) D.C
 - (C) Both A.C and D.C
 - (D) Neither A.C nor D.C

8. Two spheres of the same radius, one solid and the other hollow, are charged to the same potential. Which will have more charge?
- (A) Solid sphere
 - (B) Hollow sphere
 - (C) Both will have equal charge
 - (D) None of these
9. The potential energy of an electric dipole is maximum when it makes an angle θ with electric field. The value of θ is —
- (A) $\pi/2$
 - (B) π
 - (C) zero
 - (D) 2π
10. The Gaussian surface for a line charge will be —
- (A) Sphere
 - (B) Cylinder
 - (C) Cube
 - (D) Cuboid
-

P - I (1+1+1) H / 20 (N)

2020

PHYSICS (Honours)

Paper Code : II - B

[New Syllabus]

Full Marks : 55

Time : Three Hours Thirty Minutes

The figures in the margin indicate full marks.

Answer *five* questions taking at least *one* from each group.

Group - A

[Heat]

1. State and explain Dulong-Petit's law. Deduce the expressions for the critical constants of a gas obeying van der Waals' equation of state. 5+6
2. Write down the basic postulates of the kinetic theory of gases. From these postulates, establish the relation $k = \eta C_v$, where the symbols have their usual meanings. 4+7
3. State and explain Kirchhoff's law of radiation. Show that the energy density of radiation inside a uniformly heated enclosure is given by $U = (4\pi K)/C$, terms being usual. 4+7

Group - B

[Sound]

4. Write down the equation of motion of a particle executing one-dimensional forced vibration and explain each term. Solve this equation for the steady state. What are transient beats ? 3+8

5. (a) Deduce an expression for the velocity of transverse waves travelling along a stretched string.
(b) Derive an expression for the general displacement of a plucked string. 5+6

Group - C

[Electricity - I]

6. (a) Obtain the multipole expansion of an arbitrary charge distribution by indicating clearly monopole, dipole and quadrupole term.
(b) Using Biot-Savart law, find an expression for the magnetic field at an axial point of a coil carrying a steady current. 6+5
7. (a) A uniformly charged sphere of radius R carries a total charge Q . Calculate the electrostatic self energy of the sphere.
(b) State Gauss' theorem in electrostatics and obtain its differential form. 5+6
-