

Roll No : .....

Total No. of Questions : 11 ]

[ Total No. of Printed Pages : 3

# ASP-652

M.A./M.Sc. (Final) Examination, 2021

## MATHEMATICS

Paper - Opt-IX

(Relativity and Cosmology)

Time : 1½ Hours ]

[ Maximum Marks : 100

### Section-A

(Marks : 2 × 10 = 20)

**Note :-** Answer all *ten* questions (Answer limit 50 words). Each question carries 2 marks.

(खण्ड-अ)

(अंक : 2 × 10 = 20)

**नोट :-** सभी दस प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 50 शब्द)। प्रत्येक प्रश्न 2 अंक का है।

### Section-B

(Marks : 4 × 5 = 20)

**Note :-** Answer all *five* questions. Each question has internal choice (Answer limit 200 words). Each question carries 4 marks.

(खण्ड-ब)

(अंक : 4 × 5 = 20)

**नोट :-** सभी पाँच प्रश्नों के उत्तर दीजिए। प्रत्येक प्रश्न में विकल्प का चयन कीजिए (उत्तर-सीमा 200 शब्द)। प्रत्येक प्रश्न 4 अंक का है।

### Section-C

(Marks : 20 × 3 = 60)

**Note :-** Answer any *three* questions out of five (Answer limit 500 words). Each question carries 20 marks.

(खण्ड-स)

(अंक : 20 × 3 = 60)

**नोट :-** पाँच में से किन्हीं तीन प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 500 शब्द)। प्रत्येक प्रश्न 20 अंक का है।

**BI-450**

( 1 )

**ASP-652** P.T.O.

### Section–A

1. (i) Define Particle Acceleration.
- (ii) Define Parallel Velocity.
- (iii) Define Equivalence of Mass.
- (iv) Define Proper Time.
- (v) Define General Covariance.
- (vi) Define Singularity.
- (vii) Write Kepler's Law.
- (viii) Define Einstein Tensor.
- (ix) Write Hubble Law.
- (x) Define Weyl's Postulate.

### Section–B

2. Derive Special Lorentz Transformation Equation.

*Or*

Derive Relativistic transformation formula for velocity.

3. Derive transformation formula for momentum and energy.

*Or*

Derive space-like.

4. Derive Newtonian approximation of equation of motion.

*Or*

Explain reduction of Einstein field equation to Poisson's equation.

5. Discuss Radar Echo delay.

*Or*

Derive Schwarzschild interior metric.

6. Derive Lorentz invariance of Maxwell's equations.

*Or*

Discuss static Cosmological models.

**Section–C**

7. Derive Lorentz-Fitzgerald contraction formula.

8. Write short notes on the following :

(i) Minkowski space

(ii) Time like

(iii) Null come

(iv) Proper time

9. Derive relativistic differential equation for orbit of the planet.

10. Write and discuss *three* crucial of tests of general relativity.

11. Discuss energy-momentum tensor for electromagnetic field.