**S4 MARKING SCHEME PHYSICS 2021**

**PART I: MULTIPLE CHOICE QUESTIONS (20 MARKS)**

**1)c (2 marks) 2)** **d)(2 marks) 3) c (2marks)** networkW**=**

**4) c)(2 marks) 5) b)(2marks) 6) c)(2 marks 7) b)(2 marks) 8)a)(2 marks)**

**9)a)(2 marks) 10)b)(2 marks)**

**PART II (80 MARKS)**

**11)**a) Chromatic aberration **(1mark)** spherical aberration**(1mark)**

 coma, astigmatism, barrel distortion ,pincushion distortion

 b) (i)Image position**(1mark)**

  , p’=-87.5 cm **(1mark)**

 (ii)the size of the image **(1mark)**

**(1mark)**

(iii)Properties of the image

 Image is virtual **(1mark)** p’ is negative

 Image is erect (upright) **(1mark)** hi is positive

Image is magnifiedhi is greater than ho

 c) (i)The process of splitting of white light into seven colours by

 prism **(1mark)**

(ii)1. The angle of refraction on AB

 1xsin20˚ =1.6 sinr **(1mark)**

 r=12.3˚**(1mark)**

 2. The angle of incidence on AC

 A=r+r’ **(1mark)**

 r’=40˚-12.3˚ =27.7˚(**1mark)**

3. The angle of emergence

 1.6xsin27.7˚=1xsini’ **(1mark)**

 i’=48˚**(1mark)**

**12)**a)(i)Stable equilibrium **(1mark)**

Unstable equilibrium **(1mark)**

 Neutral equilibrium **(1mark)**

(ii)Net force is equal to zero **(1mark)** or

 **** Algebraic sum of x and y components of the

 external forces applied to the object must be equal to 0

 respectively.

 Net torque is equal to zero **(1mark)**

.The algebraic sum of the clockwise torques is equal

 to the algebraic sum of the counterclockwise torques.

 b) (i)Centre of gravity **(2marks)**

 (ii)1m from the extremity A of the board **(2marks)**

 (iii)Direction of forces

 

 (iv)Torque is positive in anticlockwise direction and the reference

 point is the support A

 

 Torque of the support force  with respect to point A

 

 Torque of the support force with respect to point A

  **(1 mark)**

 Torque of the weight  with respect to point A

  **(1 mark)**

 

 1.5 FB-240=0

 FB= 240N/1.5=160 N **(1mark)**

 

 FA+FB-240N =0

 FA =240-160N=80N **(1mark)**

**13)**a)(i)Electromotive force is energy per unit electric charge that is

 imparted by an energy source**(1mark)** such as electric generator

 Or the work done on a unit of electric charge or the energy

 thereby gained per unit electric charge

 (ii)Resistance of the conductor is the opposition to the flow of

 electrical current through a conductor**(1mark)**

You can also accept the potential difference across the

 conductor divided by the electric current through it

 b)(i)The 2 Ω and 4 Ω resistors are in series

 R1 = 2Ω+4 Ω**(1 mark)**

 =6 Ω**(1mark)**

The 3 Ω, 6Ω and 1 Ω resistors are in series

 R2 =3 Ω+6Ω+1Ω

 =10Ω**(1mark)**

 The resistors having the resistances R1 and R2 are in parallel

 **(1mark)**



 The equivalent resistance R =3.75Ω **(1mark)**

 (ii)The internal resistance E=(R+r)I **(1 mark)**

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 **(1mark)**

 (iii)The terminal voltage V=RI **(1mark)**

 =1.5 Ax3.75 Ω=5.625V **(1mark)**

(iv)Ammeter **(1mark)**

 (v)The reading is I=1.5 A **(1mark)**

 (vi) 1)the current **(1mark)**

 **(1 mark)**

 2) The current ** (1mark)**

 **(1mark)**

**14)** a)The time of flight  **(1mark)**

 **(1mark)**

 **(1mark)**

 b)The horizontal range x=vt**(1 mark)**

=50 m/s x4.5 s **(1mark)**

 =225 m **(1mark)**

**15)**a)Every planet’s orbit is an ellipse with the sun at a focus

 **(3marks)**

A line joining the Sun and a planet sweeps out equal areas in

 equal times

 The square of a plane’s orbital period is proportional to the cube of

 its distance to the Sun.

 b) (i)The work required to move a body of unit mass from

 infinity to a givenpoint **(2 marks)**

 (ii)Gravitational potential at infinity is zero hence the gravitational

 forces are always attractive. So the work needs to be done against

 the force in moving the body from the infinity to the given point

 **(1mark)**

c)(i)The angular velocity **(1 mark)**

**(1mark)**

 (ii)Centripetal force ** (1mark)**

 ****

=34.57x10**21**N **(1 mark)**

(iii)The origin of the centripetal force is gravitational potential

 strength**(1mark)**

 (iv)The mass M of the Sun

 We know that the gravitational force is equal to the centripetal force

 **(1mark)**

 **(1mark)**

 =1.94 x1030kg **(2 marks)**

**16)**a)(i)attract **(1mark)**

(ii)repel **(1mark)**

 b)(i) **(2 marks)**

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 (ii)**(**2marks**)**

 

c)(i) **(1mark)**

**(1 mark)**

(ii)

 