**Q1) Put True and False and correct the following: (Group A) (answer 10 only)**

1. Sun equator taken about 30 day to rotated about its axis but polar region less that. **(F), opposite case**
2. It’s believed that sunspots have strong magnetic fields that exist in the interiors, polarity of each sunspot always the same for a given hemisphere. (**T)**
3. Water vapor absorbed Radiation through rotational states, at longer wavelength larger than 15um to 1000um. **(F)** 25um
4. Many atmospheric radiative transfer calculations can be simplified by use plane-parallel approximation in which temperature and density of the various atmospheric constituents are assumed to be functions of height or pressure only. **(T)**
5. Visible wavelength in range 400-750 nm is subturned freq. from 4\*10^14 – 7.5\*10^14 Hz. **(F)**
6. Superposition happened in waves, when its travel in the same medium and in the same moment of time, that propagated individual from. **(T)**
7. Huygen’s principle used to describe bending photon particle around obstacles, every point on a wave front can be considered as a source of wavelets. **(F) light**
8. In Huygens’s experiment principle for apertures that are small compared to the wavelength the aperture becomes like a source and spherical waves result if a perture increases diffracted waves becomes more and more like incident plane wave **(T)**.
9. There are many different types of electromagnetic waves but it’s don’t determine any one by freq. and wavelength **(F)**.
10. Maxwell said that light is transvers wave travel through vacuum with speed 3\*10^-3 called electromagnetic wave **(T).**
11. Positive interference arise at the instant, where the two pluses waves overlap produce a resultant shift that greater than the shift of either wave. **(T)**
12. The amount of refraction depends primarily on two factors density of the material and angle which the light enters the material. **(T)**
13. Without the atmosphere there would be no refraction or scattering and sun can set and rise in later time. **(F) ……early**
14. If white light traveling in a vacuum and when it hit a glass prism the white light will separate in to the entire visible spectrum and this known as diffraction. **F Dispersion .**
15. If angle of incident is more than angle of reflected then the ray bends for from normal. **(F)**  Towards the normal

**Q1) Put True and False and correct the following: (Group B)**

1. Deflection known as bending of light around obstacles according to principle of Maxwell. **(F)** **Huygens**
2. Attraction of earth by other planets, eccentricity, obliquity earth rotation and sunspots consider the main causes of change earth orbit about the sun. **(F)** without sunspots
3. Superposition can be applied on the mechanical waves that need medium to travel if displacement not too large and restoring force obeys Newton law. **(F)**
4. On the electromagnetic waves propagation wavelength can equal to 417nm for frequency range 7.2\*10^14 Hz. **(T)**.
5. At 0.3R depth (R=Radius) from the sun surface, density is about 50kg/m3, but density become about 5-10 kg/m3 at 10km from sun surface. **(F)** 70kg/m3, at sun surface
6. Newton’s corpuscular theory failures to explain phenomena such as interference and diffraction, thus this theory is rejected **(T)**.
7. Direction of vibration along direction of propagation determine longitudinal or transverse wave, thus if vibration is along direction of propagation waves is known as transverse **(F)**.
8. Spectral radiance is flux per unit area per unit solid angle per unit wavelength have units watts per square meter per steradian per nanometer **(T)**.
9. Interference is one of light phenomena its consider type of superposition, that depend on combines waves directionally. **(F)** algyprcally
10. Equation Phase velocity of wave, change to the negative direction, if sinusoidal wave traveling along Y-axis. **(F) x-axis**
11. With help of corpuscular theory Einstein could explain both reflection and refraction phenomena by assumed light travel faster in denser medium. **(F) Maxwell**
12. One of the application optical depth is scanning radiometers which used to received radiation emitted along long oblique both in atmosphere, its depend on the air mass or thickness depth. **(F) zenith angle**
13. Maxwell assumed in its experiment, wave front consists of a line that is tangent to all wavelets, this results from consider every point on wave front expected as a source of wavelets move in the same speed of the wave itself. **(F)** Huygens
14. Violet light have a low index of refraction and travel with a lower velocity compared to red wavelength light. **(T)**
15. Mirage created by light that passed in air changed its density because change in the temperature. **(T)**

**Q2) Choose the correct answer: (Group A)**

1. …………..is consider as branch of physics which deal with light its effect sources, nature and its properties.
2. Electromagnetic waves b. radiation c. irradiance d. quantum optics c. optics
3. Planets sometime twinkle when they are near …………where the bending of their light is ……………………..
4. Vertical , great b. horizontal, greater c. 30degree , 60 degree d. 180 degree , downward
5. Quantum optics treats light as a stream of particles called …………………
6. Photoelectric b. photon c. proton d. spark gap e. electric energy
7. Yellow color have wavelength in range ……………………. In units nanometer.
8. 650-800 b. 600-650 c. 550-600 d. 400-500 e. 450-500
9. Sensitivity of human eyes varies with wavelength Thus ……………….is most sensitive to the violet colour and least sensitive to the red colour.
10. Radiation b. photograph c. refraction d. defection e. Greenflash
11. ………………….mean that our eye fails to distinguish between then. If time interval between two light pulses be less than 0.1 second.
12. Resolving power b. persistence of vision c. coharns d. corpuscular e. interferences
13. When light goes from one medium to another its frequency remains …………….. but both the speed and wavelength …………………
14. Unchanged, change b. change, unchanged c. constant, change d. unchange, constant e. low, large value
15. If light passes through the medium partially then it is said to be ……………….
16. Transparent b. translucent c. opaque d. anisotropic e. unidirectional beam light
17. ………………..suggested that each point on the source of light acts as a centre of disturbance from which the waves spread out in all direction and direction of propagation of light is perpendicular to the wave front.
18. Newton b. Einstein c. fizeau’s method d. Maxwell e. Huygens
19. The magnitude of electric field vector is …………….. as compared to magnetic field vector. E=CB, where C=speed of light.
20. Large b. smaller c. little large d. much large e. nearly constant
21. Chromosphere is a gaseous layer with high temperature and low density and depth about 10000km above this layer is ………………….

a. Chromosphere b.Photosphere c.Reversing layer d.Corona layer

1. ………………………is the rate at which radiant energy is incident on a surface per unit area of surface in unit’s W/m2.
2. radiant exposure b.insolation c. radiosity d. emissive power

**Q2) Choose the correct answer: (Group B)**

1. …………………one of these don’t consider as optics classification. Its …………
2. Wave optics b. geometrical optics c. ray optics d. photon optics e. physical optics
3. Electric field oscillates perpendicular to the magnetic field and both are in the same ……………………..with each other.
4. Superposition b. wave front c. phase front d. freq. e. speed of light
5. Blue colour have wavelength in range …………………….in units nanometer.
6. 650-800 b. 550-600 c. 500-550 d. 450-500 e. 400-500
7. Violet colour have miximum frequency in range …………………….hertz.
8. 4.4\*10^14 b. 5.4\*10^14 c. 6.5\*10^-14 d. 7.5\*10^14 e. 8.4\*10^14
9. ………………..mean that our eye fails to see two points separately if they subtend an angle equal to or less than 1 mine.
10. Persistence of vision b. resolving power c. coherence d. corpuscular e. interference f. isotropic
11. According to newton theory to interpretation light newton explained ………………on basis of attraction of corpuscles by the surface.
12. Colours b. reflection c. refraction d. interference e. diffraction
13. One of these phenomena fail to explains by wave theory it’s ………………….
14. Dispersion b.rectilinear propagation c. interference d. photoelectric light e. reflection
15. ……………………….define as a light that having electric field oscillations in all directions in the plane perpendicular to direction of propagation.
16. Unpolarised b.Polorised c. Poynting d. Polaroid e. dichorism
17. Distance from center of the sun to the outer boundary refer to the radius R where 0.23R contain about ………………….of mass of sun .

 a.90% b.40% c.23% d.10%

1. ……………forms when tiny suspended column – type ice crystals (with diameters less than 20 micrometer) that randomly oriented in air molecules.
2. Halos b. rain bow c. migrant d. glory
3. Loud speaker alternately expands and compresses air molecules that is in contact to produce ……………………
4. Longitudinal wave b. crest and through c. compression d. sound wave

12- When light enters narrow slit, it diffract in different directions, concentrative and destructive interference create …………………….respectively on screen a way distance from source.

a. dark and bright regions b. bright and dark regions c. light wave form d. crest and through

**Q3) Choose the correct mathematical answer: (Group A)**

1. Temperature in central interior regions is estimated to about………….. kelvin , while, density estimated to be about ………………kg/m3
2. 55\*10^5,10000 b. 40\*10^6,100000 c. 180000,4\*10^5 d. 10^5, 3\*10^6 e. 3\*10^7 , 100000
3. If wavelength of a wave is 𝜆 = 6000 Å. Then wave number will be :

a. 166 x 10^3 per m b. 16.6 x 10^–1 per m c. 1.66 x 10^6 per m d) 1.66 x 10^7 per m

1. At elevation ……… above earth surface any solar radiation in wavelength below 100nm is absorbed, in 10km most solar radiation at wavelength ………. is absorbed.
2. 100,200 b.1000,2000 c. 150,300 d. 100,250 e. 100,290
3. In rainbow because each light that strikes the back of a raindrop at an angle exceeding the critical angle bounces off the back of the drop and internally reflected toward our eyes for red light the reflected angle is ………… for the beam sun light far violet it is ………….. .
4. 42°, 40° b. 46°, 22° c. 22°,46° d. 22°,42°
5. At higher zenith angle earth curvature become significant and must be taken in to account for example at zenith angle …………, air mass equal to ……………..

a. 90, 2 b. 60, 2 c.30, 1 d. 60, 1

1. A ray of light takes same time of travel through air and glass. If thickness of glass is 5 cm and μ= 1.5, then distance travelled through air is:

 a.5 cm b.7.5 cm c.6 cm d.8 cm

1. Light enters glass from water, then:

a. Wavelength remains same b. wavelength decreases c. frequency increases d. Wavelength increases

1. The refractive indices of glass and diamond with respect to air are 1.5 and 2.4 respectively. The refractive index of diamond with respect to glass is:

a. 0.62 b. 0.9 c. 1.95 d. 1.6

1. The frequency of light in air is 5 x 10^14 Hz. What will be the frequency of light when it enters in the water?

a. 2.5 x 10^14 Hz b. 5 x 10^14 Hz c) 10^15 Hz d. 2.5 x 10^12 Hz

1. We may state that the energy (E) of a proton of frequency $v$ is E = hv, where h is Planck's constant. The momentum p of a photon is p=h/𝜆 where 𝜆 is the wavelength of the photon. From the above statement one may conclude that the wave velocity of light is equal to :

a. 3 x 10^8 ms–1 b. the ratio E/ p c. the product: E/p d. the ratio (E/ p)^2

**Q3) Choose the mathematical correct answer: (Group B)**

1. In the light polarised by reflection, the angle between reflected and refracted ray is:

0 b.$π/$6 c. $π$ /3 d.$π/2$

1. Sun subtends an angle ……………degree at any location on the earth through one a astronomical units distance 1.5\*10^8 km.
2. 23.5 b. 22.5 c. 35 d. 32 e. 5
3. If value of angular velocity is 100π hertz, thus the object rotates in frequency equal to ………………….rev./sec.
4. 500 b. 50 c. 0.05 d.0.5 e. 5000
5. Two points A and B are situated at the same distance from a source of light, but in opposite direction from it. The phase difference between the light waves passing through A and B will be:

a. Zero b. $π$ / 2 c. $π$ d. none of the above

1. When sun is at zenith angle air mass equal to ………………….at sea level.
2. Two b. one c. m=3 d. m=2 e. m=0.5
3. If sun have diameter about 1.39\*109m thus the rate of this diameter to the earth sun distance is …………….. (Where earth far about 1.5\*109 km from the sun)
4. 0.932\*10-2 b.0.3 c. 0.26\*10-3 d. 0.7\*10-2
5. Photons of wavelength 600 nm are emitted from a 60 watt lamp. What is the number of photons emitted per second? Take, h = 6.6 \* 10^–34 Js :

a. 2 \* 10^16 b. 2 \* 10^18 c.2 \* 10^20 d. 2 \* 10^22

1. If the speed of a proton is c/10 then wavelength associated within will be:

a.1.32 \*10^–14 m b.52.8\*10^–10 m c.6.62\*10^–14 m d.528\*10^–20 m

1. What is the angle between the direction of oscillation of the light waves and the direction of propagation?

a.zero b. 4/$ π$ c.2$/ π$ d. $π$

1. Which of the following cannot be polarised ?

a. Radio waves b.Sound waves c.Transverse waves d.X-rays

1. The nature has selected electromagnetic waves of wavelength between 400 nm to 800 nm for human vision. Which of the following could be the most suitable reason for this selection?

a. They are of different colours b. They are emitted in abundance by the sun c. They are emitted from all bodies d. They can be reflected & scattered by material bodies