
PSQC21 Final Round Key

Time and Date of competition: 7:00 PM IST, 17th January 2021

Total points: $60+17= 77$

Bonus points scoring scheme:

7:00:00-7:02:00- 17 points

7:02:01-7:02:30- 11 points

7:02:31-7:03:00- 9 points

7:03:01-7:04:00- 7 points

7:04:01-7:05:00- 5 points

NOTE: Bold option represents the correct answer

We are providing this key to all the participants to learn from their mistakes and improve their knowledge of Physics and Astronomy!

1. *How many planets are visible to the naked eye on a clear night sky? (assume all planets are visible from earth at the time)*

Options:

- A. 4
- B. 5**
- C. 2
- D. 3

2. *What is the name of the phenomena that causes a black hole to lose mass over a period of time?*

Options:

- A. Hawking Radiation**
- B. Celestial Radiation
- C. Cosmic Radiation

D. Planck Radiation

3. What is the half life of Uranium-238

Options:

- A. about 25000 years
 - B. About 96 million years
 - C. about 838.7 million years
 - D. about 4.5 billion years**
-

4. How long is a day on the Sun? (time taken for one rotation)

Options:

- A. 0 (sun does not rotate)
 - B. 25-30 Earth days**
 - C. 45-48 Earth days
 - D. 104-118 Earth days
-

5. Which space agency built the famous "Rosetta" probe, the first to be sent to orbit a comet?

Options:

- A. NASA (USA)
 - B. CNSA (China)
 - C. JAXA (Japan)
 - D. ESA (Europe)**
-

6. What are the two postulates of the theory of special relativity?

Options:

- A. High velocity time dilation postulate and Relativity postulate
 - B. Relativity postulate and constancy of speed of light postulate**
 - C. Constancy of light postulate and The postulate of time dilation
 - D. The inertia-acceleration postulate and high velocity time dilation postulate
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7. Why does light bend near massive objects- stars, galaxies, etc?

Options:

- A. The surface of stars are curved and therefore light curves around it
 - B. The rotation of stars and galaxies causes a weird unknown phenomena that causes light to move around the mass
 - C. Unknown
 - D. Mass curves space and light follows that curve**
-

8. On what does the mass of a String (in string theory) depend?

Options:

- A. The frequency of vibration of the string**
 - B. The velocity of the string through space
 - C. The location of the string (mass is different in different regions of the Universe due to uneven inflation)
 - D. None of the above
-

9. Which of the following is the most powerful operational rocket?

Options:

- A. Saturn V (NASA)
 - B. Sea dragon (NASA) (Never built)
 - C. Falcon Heavy (SpaceX)**
 - D. SLS (Satellite Launch System- NASA)
-

10. The photoelectric effect is proof of-

Options:

- A. Wave nature of light
 - B. Particle nature of light**
 - C. Wave-particle duality
 - D. Wave-particle-photoenergy triality
-

11. Which of the following is the lightest particle?

Options:

- A. Neutrons
 - B. Electrons
 - C. Leptons
 - D. Neutrinos**
-

12. What is the name of the singularity of a rotating black hole?

Options:

- A. Singularity (because rotation has no effect)
 - B. Circularity
 - C. Ringularity**
 - D. Rotational singularity
-

13. What is the range of a photon? (How far can a photon travel if one is shot from Earth?)

Options:

- A. the photon will cease to exist after travelling 100 million light years
 - B. the photon will cease to exist after travelling 20 billion light years
 - C. the photon will cease to exist after travelling 50 billion light years
 - D. the photon will never cease to exist and will travel till Infinity**
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14. What is the name of the largest known star?

Options:

- A. VY Canis Majoris
- B. UY Scuti**
- C. TON 618

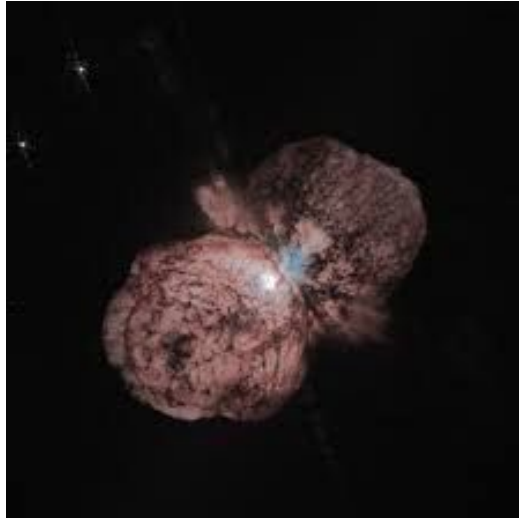
D. IC1101

15. Which spacecraft carried the “Huygens” lander that landed on Saturn’s largest moon, Titan?

Options:

- A. Voyager 2 (deployed Huygens while it passed Saturn)
 - B. Cassini**
 - C. Pioneer 11
 - D. No spacecraft carried Huygens- it was an independent mission
-

16. What is the name of the famous Star system shown below?



Options:

- A. 61 Cygni
 - B. Super Mintaka
 - C. Eta Carinae**
 - D. Alnilam
-

17. Which state of matter is reached when plasma is heated to extremely high temperatures (Temperatures as high as those encountered during the beginning of the Universe)?

Options:

- A. Highly ionized proton-electron-neutron plasma
 - B. plasma nuclear pasta
 - C. Quark-gluon plasma**
 - D. Quantum heated plasma
-

18. Which of the following type of star is commonly known as a “failed star”?

Options:

- A. Black dwarf
 - B. Unignited Red Dwarf
 - C. Brown Dwarf**
 - D. none of the above
-

19. What is Vega’s apparent magnitude?

Options:

- A. 2
 - B. 0**
 - C. 19
 - D. -3
-

20. What is the name of the mysterious force that is causing the universe to expand?

Options:

- A. Dark matter
 - B. Dark energy**
 - C. Dark flow
 - D. Dark energon
-

21. Which telescope is set to be the descendant of the Hubble Space Telescope?

Options:

- A. Artemis I Space Telescope
 - B. Hubble Space Telescope II
 - C. Super Laser Beam Space Telescope (SLB)
 - D. James Webb Space Telescope**
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22. Why is the wave nature of matter not visible to us at macroscopic scales?

Options:

- A. Because mass is too high**
 - B. Because velocity of everyday objects relative to size is too fast
 - C. Because planck's constant is actually bigger at macroscopic scale
 - D. none of the above
-

23. Which phenomena is observed when a particle travels faster than light?

Options:

- A. None (nothing can travel faster than light)
 - B. Electromagnetic Boom
 - C. Cherenkov Radiation**
 - D. Black hole is created
-

24. Which instrument is used to measure the relative humidity of the air?

Options:

- A. Hygrometer**
 - B. Hydrometer
 - C. Humidometer
 - D. Barometer
-

25. What causes a dancer or ice skater to spin faster when they pull their hands inside?

Options:

- A. Conservation of angular momentum**
- B. When hands are pulled inside, surface area decreases and air drag is less.

- C. Hands don't have an effect, it is a stunt. While pulling their hands, dancers push themselves towards the direction of spin to spin faster.
 - D. Conservation of energy
-

26. The direction of axial tilt of the Earth changes every few thousand years. After 13000-14000 years, which star will be the North Star?

Options:

- A. Vega**
 - B. Polaris
 - C. Rigel
 - D. Betelgeuse
-

27. What is the velocity of an electron in a hydrogen atom? (assume Bohr atomic model)

Options:

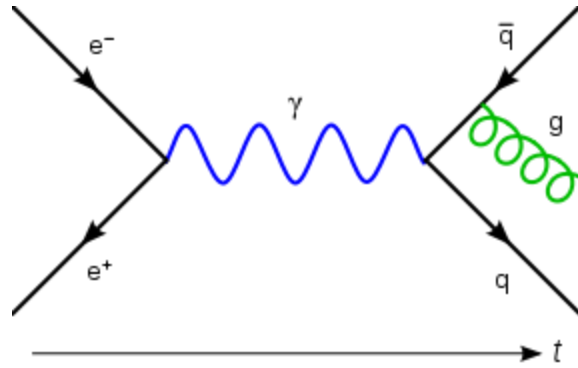
- A. almost 0 (as orbit is EXTREMELY small)
 - B. 3.9×10^{-4} m/sec
 - C. 4.36×10^3 m/sec
 - D. 2.18×10^6 m/sec**
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28. How many people have been to the moon?

Options:

- A. 2
 - B. 7
 - C. 9
 - D. 12**
-

Answer questions 29-30 by observing the image given below



29. What is in the image above (or) what does the image show?

Options:

- A. James Clerk Maxwell's quantum electromagnetic interaction diagram
- B. Nikola Tesla's idea for infinite electricity generation
- C. Feynman Diagram from quantum electrodynamics**
- D. Einstein's electrodynamic theory

30. What is " γ " in the diagram above?

Options:

- A. Gamma radiation
 - B. Photon**
 - C. Neutrino
 - D. Pure energy (released from interaction of electron and anti-electron particle)
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