

Q1. a) Ptolemaic System : This system, given by Claudius Ptolemy, built on the existing geocentric models of the universe from Plato's and Aristotle's (and Eudoxus') times. In attempting to solve the issue of unequal seasons, Ptolemy placed the Earth not at the centre, but just off the center, or eccentric (ex – centric) while the planets were still around the Earth in their own spheres. To explain the changing brightness of planets as observed by many astronomers and the retrograde motion/looping (the apparent change in direction of the movement of the planets during their revolution, not known to be a result of observation but thought of as the actual motion of the planets at the time), Ptolemy proposed that planets revolved around small circular paths or epicycles which were centered on a large sphere called the deferent. He proposed the position of the equant, a point directly opposite the Earth's position on the other side of the deferent's center, from where the epicycle's center could hypothetically be seen to move at a constant speed. This system was much more complicated/cumbersome than previous geocentric models and future heliocentric ones but fit observational data well, to an extent (until better observation equipment was built and further inconsistencies were found).

b) Copernican System : This system was proposed by Nicholas Copernicus, who was well versed in canon law and had studied as a humanist but had a great interest in astronomy. His critical thinking practices led him to notice the many inconsistencies of the Ptolemaic model (with respect to new observations being made) and he further critically analysed (as a Renaissance humanist would) Ptolemy's work *Almagest*. He thus proposed the heliocentric model, where the Sun was taken to be the centre of the universe. He had looked for a simpler model of the universe than the Ptolemaic model and thus did away with the concepts of epicycles and deferents, but maintained that all the planets, including Earth, revolved around the Sun in circular (the most harmonic shape, as Plato believed) orbits and explained the retrograde motion as only an illusion (arising out of the combination of the Earth's motion and that of the other planets). This model was not free of anomalies, and was contrary to the beliefs rooted in Christian theology of most of the people of his time, as well as the lack of observational data of Earth moving itself, but this model helped create and calculate astronomical charts, as well as Ptolemy's model.

c) Tychonian System : Tycho Brahe was known to be very meticulous in his observations of the stars and planets. He had his own observatory (being funded by the Danish King Frederick II) and was able to produce much better data than Copernicus or Ptolemy, and hence his astronomical charts were also far more accurate. He thus observed a new nova (Tycho's star) and a comet, which crumbled the Aristotelian idea that the heavens beyond Earth were unchanging and led to Brahe proposing his own model of the universe. He did not agree with Copernicus that the Earth revolved around the Sun, as no one could feel that movement himself, and hence, in his geocentric model, placed Earth at the center, with the other planets revolving around the Sun (partial adoption of the Copernican system), which in turn revolved around the Earth.

Q2. a) Encomienda : It was a labour system (in Mainland America/Tierra Firme) imposed by the Spaniards in the New World which sought to exploit the indigenous people by essentially keeping them as slaves. In Spanish, encomendar means to entrust and the Spanish were hence entrusted with the task of spreading the Christian faith to the conquered tribes, also seen as the reward that these tribes earned by doing work for the conquistadores. The Spanish Monarchy thus granted each Spaniard in the New World with a certain number of natives, through the issuing of a grant, and the encomenderos were thus in charge of these natives to teach them Christian theology, in return for their work. They also often barbarically treated and abused the natives.

b) Spanish American social ordering in the 16th century (based on casta or lineage) was as follows :

1. Peninsulares : Spaniards living in America
2. Creoles/Criollos : Spaniards born in America
3. Mestizos : People of mixed European and indigenous American descent
4. Mulattos : People of mixed European/Indigenous American and African descent
5. Negroes : Slaves brought to the New World from Africa

The Indios (indigenous tribes) were also low in this social hierarchy and were subject to abuse, like the negroes.

c) Requerimiento : This was a declaration by the Spanish Crown (1512 – 1513), written with the consultation of Christian theologians and lawyers (in Spanish), which was read out to the native Americans after their conquest. This was done in response to complaints by some Christian orders (and some conquistadores) of the ill treatment of the natives, and was meant to justify the conquest and control of the indigenous tribes by explaining that it was the divine right of King Ferdinand and Queen Isabella of Spain to spread the Christian faith to the New World and that anyone resisting would be seen as defying God's will itself. This declaration was drafted and read out in Spanish and did not serve to communicate the ideas of Christian theology to the indigenous tribes (who did not know Spanish at all) but was more of a legal custom/ritual, meant to appease those Spaniards who may have any apprehension towards this system of enslavement of the locals.