

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION
SECOND SEMESTER EXAMINATION 2021/2022 SESSION

COURSE CODE: ITE327

COURSE TITLE: AUTOMOTIVE SCIENCE & CALCULATION

TIME: 2HRS

INSTRUCTION: Attempt only (4) Questions

1. a, Fully enumerate three equations.
b, A car moving with a velocity of 54kmh^{-1} accelerates uniformly at the rate of 2ms^{-2} . Calculate the distance travelled from the place where acceleration began to that where the velocity reaches 72kmh^{-1} and time taken to cover this distance.
c, Differentiate between scalar and vector quantity with relevant examples.
2. a, Differentiate between force and pressure.
b, The cylindrical piston of a hydraulic press has a diameter of 30cm and the plunger of a diameter 5cm. calculate (a) the upward of the piston produced by a thrust of 250N on the plunger (b) the distance moved by the piston when the plunger moves 60cm.
c, Calculate the kinetic energy of a bullet of mass 0.015kg moving with a velocity of 400ms^{-1} . If the bullet is brought to rest in 2cm by a wooden block, find the average force of resistance due to the wood.
3. a, State first and second Newton Laws of motion.
b, Calculate the force required to produce an acceleration of 3m/s^2 on a motor vehicle having a mass of 1100kg. If the initial velocity of vehicle is 12m/s. What will be the final velocity if this force is applied for 5s?
c, A ball bearing is thrown vertically upward from the ground with an initial velocity of 60ms^{-1} . What is the total time spent by the ball bearing in the air? Similarly, calculate the highest distance reached.
4. a, Differentiate between energy and power.
b, In a four-speed gear box, the constant-mesh gear pinions have 20 and 35 teeth. The second-gear main shaft pinion has 30 teeth and the meshing lay shaft wheel has 25 teeth. Calculate the second gear-ratio.
c, A stone of mass 500g is thrown vertically upward with a velocity of 15ms^{-1} Find (a) the potential energy at greatest height (b) the kinetic energy on reaching the ground (assume $g = 10\text{ms}^{-2}$ and neglects air resistance).
5. a, State all laws that governs the friction between rubbing surfaces known to you.
b, A block of mass 20 kg requires a pull of 49 newton's to move it at a uniform speed on a horizontal smooth surface. What is the coefficient of friction between the block and surface?
c, A valve and tappet assembly fitted to an overhead camshaft engine has a mass of 200g. At a given engine speed, the force to open the valve is 250 N. Calculate the acceleration of the valve under these conditions.

*****Best@wishes