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UNIT III: Transmission and Suspension Systems

Multiple Choice Questions (MCQs)

1. Which component connects or disconnects the engine's crankshaft from the gearbox input shaft at the driver's will?

    a) Propeller shaft

    b) Clutch

    c) Differential

    d) Shock absorber

2. Why are torsional coil springs arranged radially inside a single-plate clutch disc hub?

    a) To increase the friction coefficient of the linings

    b) To dampen sudden torsional vibrations and shocks during engagement

    c) To help disengage the pressure plate

    d) To balance the pressure plate assembly

3. A multi-plate clutch is most commonly utilized in which application due to its space-saving high torque capacity?

    a) Heavy-duty commercial trucks

    b) Motorcycles and racing cars

    c) Small economy passenger vehicles

    d) Earthmovers only

4. What type of clutch uses a fluid medium to transmit kinetic torque from an impeller to a runner without mechanical contact?

a) Centrifugal clutch

b) Cone clutch

c) Fluid flywheel (Fluid coupling)

d) Electromagnetic clutch

5. In a sliding-mesh gearbox, gear shifting is accomplished by:

   a) Sliding spur gears axially along a splined shaft to mesh with countershaft gears

   b) Engaging dog clutches while the main gears remain constantly meshed

   c) Using synchronizer sleeves to match shaft speeds

   d) Locking planetary gear carriers with friction bands

6. Which gearbox features gears that are always in mesh with each other, and locks gears to the main shaft using dog clutches?

   a) Sliding-mesh gearbox

   b) Constant-mesh gearbox

   c) Synchromesh gearbox

   d) Epicyclic gearbox

7. What is the function of the synchronizer ring (cone and blocker) in a synchromesh gearbox?

   a) To vary the overall final drive ratio

   b) To match the rotational speeds of the gear and shaft via friction before mechanical engagement

   c) To lock the propeller shaft during parking

   d) To reverse the direction of the countershaft

8. An epicyclic (planetary) gear train consists of a sun gear, a planet carrier with planet pinions, and an outer ring gear known as the:

   a) Laygear

   b) Splined sleeve

   c) Annulus

d) Idler gear

9. An auxiliary gear unit positioned behind the main transmission that allows the output shaft to spin faster than the engine crankshaft is an:

   a) Overdrive

   b) Torque converter

   c) Differential lock

   d) Transfer case

10. The stator in a hydrodynamic torque converter is responsible for:

    a) Directly locking the input shaft to the output shaft mechanically

    b) Redirecting fluid flow back to the impeller to multiply torque

    c) Filtering debris out of the automatic transmission fluid

    d) Disengaging the engine during deceleration

11. Which drive layout features a rigid housing around the propeller shaft that absorbs the rear axle torque reactions and thrust?

    a) Hotchkiss drive

    b) Torque tube drive

    c) Front-wheel drive layout

    d) Independent trailing arm drive

12. Why are universal joints (U-joints) fitted at the ends of a propeller shaft?

    a) To allow for changes in length as the suspension deflects

    b) To transmit torque smoothly through varying angular misalignments between transmission and axle

    c) To multiply torque before it reaches the wheels

    d) To reduce the unsprung weight of the wheels

13. What component allows the two driving wheels on a rear axle to rotate at different speeds while turning a corner?

    a) Slip joint

b) Constant velocity joint

c) Differential

d) Synchromesh hub

14. In a fully-floating rear axle, the axle shaft is subjected to:

a) Torsional drive torque only

b) Bending stresses from vehicle weight only

c) Both torsional torque and vertical bending stresses

d) Axial thrust forces only

15. Which component of a tire carcass consists of rubber-coated parallel cords that provide the structural strength and pressure containment?

a) Tread

b) Bead wires

c) Plies

d) Sidewall

16. What is the fundamental objective of an automotive suspension system?

a) To synchronize spark timing with engine RPM

b) To isolate the vehicle body and passengers from road shocks while maintaining tire-to-road contact

c) To change the gear ratios automatically based on terrain

d) To distribute braking force equally between front and rear wheels

17. A suspension spring that consists of a straight alloy steel rod twisted along its longitudinal axis under wheel travel loads is a:

a) Leaf spring

b) Coil spring

c) Torsion bar

d) Air bellows spring

18. What is the purpose of a shock absorber (damper) in a suspension system?

a) To carry the entire static weight of the vehicle body

b) To quickly dampen out the oscillations of the suspension springs

c) To adjust the ground clearance dynamically

d) To prevent the tires from wearing on the edges

19. Which independent suspension system utilizes an upper and lower control arm of unequal lengths to minimize track width changes during jounce?

    a) Rigid axle leaf suspension

    b) MacPherson strut system

    c) Double wishbone suspension system

    d) Trailing arm suspension

20. A slip joint is integrated into a propeller shaft assembly to:

    a) Prevent the shaft from rotating too fast

    b) Accommodate continuous changes in the distance/length between the transmission and rear axle

    c) Transmit high-tension spark voltages

    d) Lock the differential gear nest

Fill in the Blanks

1. The friction lining materials of a clutch plate are typically riveted onto a central disc made of spring steel sheets called_____.
2. A _____ clutch uses weighted levers that fly outward under centrifugal force to engage the clutch automatically as engine speed rises.
3. The torque multiplication factor of a hydrodynamic torque converter is maximum when the output turbine is at a _____ condition.
4. In a constant-mesh gearbox, _____ are slid along splines to lock loose-running gears to the main shaft.
5. The shaft that receives power directly from the clutch assembly and drives the countershaft in a manual transmission is the _____.
6. The gear inside an epicyclic system that sits at the absolute center is called the_____.
7. In a _____ drive, the leaf springs are anchored to take up both the rear axle torque reactions and the driving thrust.
8. A cross-shaped component with four journals used to build a standard universal joint is called a_____.
9. The small bevel gears that mesh with the axle shaft side gears inside a differential housing are called _____.

10. An axle shaft configuration where the outer end is supported by a single bearing inside the housing tube and carries both vehicle weight and drive torque is a _____ axle.
11. Tires that do not utilize an inner tube because they form an airtight seal directly against the wheel rim are called_____ tires.
12. The aspect ratio of a tire is defined as the ratio of tire section _____ to tire section **width**, expressed as a percentage.
13. A_____ consists of a series of curved steel strips stacked together, where the longest strip is called the master leaf.
14. The suspension system layout where the movement of one wheel affects the camber and position of the opposite wheel on the same axle is a _____ suspension system.
15. A _____ suspension combines a coil spring and a hydraulic shock absorber into a single structural vertical assembly, eliminating the upper control arm.
16. The weight of the vehicle components not supported by the suspension springs, such as wheels, brakes, and axles, is called **unsprung** weight.
17. A _____ is a hinged link used at one end of a leaf spring to allow its physical length to change as it flexes.
18. The component inside a hydraulic shock absorber that creates resistance to fluid flow to absorb kinetic energy is the_____.
19. The dynamic force that attempts to rotate the rear axle housing in a direction opposite to wheel rotation when accelerating is called_____.
20. A clutch type shaped like a truncated cone which provides high wedging friction torque but is prone to grabbing is the _____.