BIRLA INSTITUTE OF TECHNOLOGY
MESRA – 835215, RANCHI, INDIA

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Name: …………………………………………………. Roll No.: ……………………………………..

Branch: …………………………………………………. Signature of Invigilator: ……………………
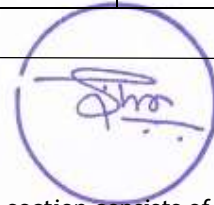
Semester: VIth   Date: 25/04/2022 (MORNING)

Subject with Code: ME305 AUTOMOBILE ENGINEERING

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE

1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.

2. The booklet will be distributed to the candidates before 05 minutes of the examination. **Candidates should write their roll no. in each page of the booklet.**

3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.

4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.

5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.

6. Write on both side of the leaf and use pens with same ink.

7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.

8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.

9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.

10. Always maintain the highest level of integrity. Remember you are a BITian.

11. Candidates need to **submit the question paper cum answer sheets before leaving the examination hall**.

CLASS: BTECH   SEMESTER : VI
BRANCH: MECHANICAL   SESSION : SP/22

SUBJECT: ME305 AUTOMOBILE ENGINEERING

TIME:
2:00 hrs   FULL MARKS: 50

INSTRUCTIONS:
1. Please write the correct answer with number in the answer scripts for section 1.
2. There are choices in section 2.
3. The missing data, if any, may be assumed suitably.

Section 1
All questions are compulsory. Each question carries one mark. **[30 marks]**

Q1. What is the function of distributor in the battery ignition system?
   a. Distribute high tension current from ignition coil to secondary winding
   b. Distribute high tension current flow ignition coil to spark plugs
   c. Opens and closes the secondary circuit of coil
   d. Distribute low tension current to ignition coil

Q2. Which part of ignition system connects and disconnects primary circuit?
   a. Distributor
   b. Condenser
   c. Contact breaker
   d. Ignition coil

Q3. Which sensor located in the intake manifold or throttle body?
   a. Mass air flow sensor
   b. Oxygen sensor
   c. Hall effect sensor
   d. Air vertex sensor

Q4. Which senor is used to sense vibration?
   a. Engine knocking sensor
   b. Hall effect sensor
   c. Air vertex sensor
   d. Vehicle speed sensor

Q5. The magnetic strength of the solenoid can be increased by
   a. decreasing the density of the turns
   b. increasing the current flow in the coil
   c. increasing the density of the turns and decreasing the current flow in the coil
   d. increasing the current flow in the coil and decreasing the density of the turns

Q6. If the traction resistance is equal to the total running resistance, then which of the following will happen?
   a. The vehicle will accelerate
   b. The vehicle will decelerate
   c. The vehicle will run at a constant velocity
   d. The vehicle will come to rest

Q7. The coefficient of rolling resistance depends on
   a. Tyre materials
   b. Road material
   c. Presence & absence of liquid on the roads
   d. All the above

Q8. A machine member used to connect engine shaft to gear box is called
   a. Differential
   b. Clutch
   c. Flywheel
   d. propeller shaft

Q9. _____ is used to ensure that the main shaft and main speed gear to be locked to it are rotating at the same speed.
   a. Transfer Case
   b. Transaxle
   c. Shift fork
   d. Synchronizer

Q10. Increase of torque in a vehicle is obtained by
   a. decreasing speed
   b. decreasing power
   c. decreasing petrol consumption
   d. all the above

Q11. In which of the gearbox all gears are always in contact?
   a. Constant-mesh gearbox
   b. Sliding mesh gearbox
   c. Epicyclical gearbox
   d. All the above

Q12. Which of the following is not part of automatic transmission?
   a. Epicyclic gearbox,
   b. Torque convertor,
   c. Multi-plate clutch,
   d. Sliding mesh gearbox

Q13. On diaphragm spring clutch, pressing down on the clutch pedal moves throw out bearing in against the
   a. Release lever
   b. Diaphragm
   c. Pressure plate
   d. Friction disc

Q14. Which member of a torque converter is also known as reactor?
   a. Lock up clutch
   b. Stator
   c. Impeller
   d. Turbine

Q15. The component of the torque converter that redirects the flow of oil to impeller is
   a. turbine
   b. impeller
   c. stator
   d. freewheel

Q16. In four-wheel drive there is (are)
   a. no live axle
   b. one live axle
   c. two live axles
   d. one dead axle

Q17. The propeller shaft consists of
   a. Knuckle joint
   b. flange coupling
   c. universal joint
   d. Rag joint

Q18. The following diverts the power at right angles towards the driving wheels.
   a. Torque tube
   b. Transfer case
   c. Final drive
   d. Differential

Q19. The axle bevel gears in the differential mesh with the
   a. Differential pinion gears
   b. Ring gear
   c. Drive pinion
   d. Main gear

Q20. The track rod is connected to the track arm by a
- a. Ball joint
- b. King pin
- c. Stub axle
- d. Universal joint

Q21. _____ is the angle between steering axis and the vertical in the plane of the wheel.
- a. Castor
- b. Camber
- c. Steering axis inclination
- d. Kingpin inclination

Q22. Which system provided between axles and chassis frame?
- a. Braking system
- b. Suspension system
- c. Steering system
- d. Cooling system

Q23. For a proper steering system, each of the wheels must follow _____ .
- a. same turning circle
- b. different turning circle
- c. straight line
- d. none of the above

Q24. The purpose of a suspension damper is to
- a. take the road shocks
- b. prolong the bounce
- c. prevent the spring deflection
- d. absorb the energy in the spring

Q25. The _____ holds the tyre in the correct position.
- a. Rim
- b. Sprocket
- c. Hub
- d. Tube

Q26. In the hydraulic braking system the movement of the piston in the master cylinder produces hydraulic pressure which cause movement of the
- a. Brake lining
- b. Brake shoe
- c. Brake pedal
- d. Brake cam

Q27. In disc brake, the disc is attached to the
- a. wheel
- b. axle
- c. suspension system
- d. none of the above

Q28. Parking brake are generally operated by
- a. Hand lever operator
- b. Brake pedal operator
- c. Electrical switch control operation
- d. None of these

Q29. The condition that caused vapour locking in a braking system is
- a. Overheating of the fluid due to frequency brake application
- b. Overcooling of the braking during high speed driving
- c. Keeping the vehicle without use for an extended period
- d. An excessively high engine speed on a downhill road

Q30. Why are the helical gears used commonly in transmission over spur gears?
- a. Low cost and high strength
- b. Low noise level and high strength
- c. Low noise level and economy
- d. Low noise level and low cost

Section 2
Answer any five

Q.31   Explain the construction and working of capacitive discharge ignition system with neat sketch.   [4]

Q.32   The coefficient of rolling resistance for a truck weighing 62293.5N in 0.018 and the coefficient of air   [4]
resistance is 0.0276 in the formula R= KW +K_aV^2. N. Where A in in m^2 of frontal area and V is the
speed in km/hr. The transmission efficiency in the top gear is 6.2:1 is 90% and that in second gear is
15:1 is 80%. The frontal area is 5.574 m^2. If the truck has to have a maximum speed of 88 km/hr in top
gear. Calculate:
    i.   The engine brake power
    ii.   The engine speed if the driving wheels have an effective diameter of 0.8125 m.
    iii.   The maximum grade that the truck can negotiate at the above engine speed in second gear.
    iv.   The maximum drawbar pull available on the above engine in second gear.

Q.33   Explain the construction and working of a torque converter.   [4]

Q.34   Explain the construction and working of a differential unit with neat sketch.   [4]

Q.35   a. What is the purpose of Toe -in and Toe-out?   [2]

    b. List the requirements of the propeller shaft.   [2]

Q.36   a. List the functions of clutch.   [2]

    b. Explain the need of multiplate clutch.   [2]

Q.37   Explain the working principle of fuel cell with neat sketch.   [4]

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