

PART - A

Comprehensive Examination

First Semester 2022-2023

Name:

Id:

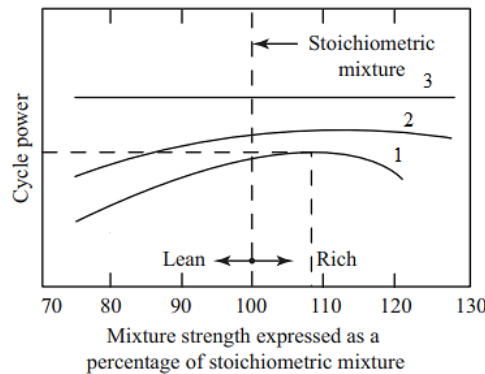
Birla Institute of Technology and Science, Pilani
ME F317: Engines, Motors, and Mobility

Close Book 30 Marks

09:00-10:00 AM, 28/12/2022

- Instructions:** 1. Please write concisely and legibly. Final answers should be clearly marked.
2. Draw neat labelled diagrams wherever necessary.
3. All parts of a question should be answered consecutively.
4. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q1. The effect of fuel-air ratio on the engine power is illustrated in the figure below using three different graphs named as 1, 2 and 3. Find out on which theories these graphs are based on and hence explain the variation. [6M]



Q2. What do you understand by *hybrid electric vehicle (HEV)*? Explain the difference between series and parallel HEVs with the help of schematic diagrams. [6M]

Q3. What are the regulated engine emissions in India? Draw the variation of these emissions with equivalence ratio for SI and CI engines. Write a short note on BSVI emission norms. [6M]

Q4. In the following table, column 1 shows different engine parameters. If these parameters are increased, then whether they will '*increase or decrease*' the knock tendency of a SI engine? Fill in the corresponding column 2 along with short reasoning for the same. [4M]

S.N.	Increase in variable	Effect on knock tendency
1	Compression ratio	
2	Engine speed	
3	Multi cylinder engine	
4	Spark advance	

Q5. Which of the following factor (s) directly affect engine heat transfer? [4M]

1. Engine output/power
2. Blow by losses
3. Engine valve timing
4. Engine size

Select the correct option(s) and justify your answer.

Q6. A four cylinder gasoline engine working on four stroke develops a brake power of 20.9 kW. A Morse Test was conducted on this engine and the brake power (kW) obtained when each cylinder was made inoperative by short circuiting the spark plug are 14.9, 14.3, 14.8 and 14.5 respectively. The test was conducted at constant speed.

Find the (i) indicated power, and (ii) bmep when all the cylinders are firing.

The bore of the engine is 75 mm and the stroke is 90 mm. The engine is running at 3000 rpm. [4M]
