

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA****FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017**

COURSE NAME	:	INTRODUCTION TO AUTOMOTIVE TECHNOLOGY
COURSE CODE	:	BNG 20103
PROGRAMME CODE	:	BNG
EXAMINATION DATE	:	JUNE 2017
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWERS ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

- Q1** (a) Engine cycles are identified by the number of piston strokes required to complete the cycle. A piston stroke is a one-way piston movement either from top to bottom or bottom to top of the cylinder. During one stroke, the crankshaft rotates 180 degrees (1/2 revolution). A cycle is a complete series of events that continually repeats.
- (i) Most of the automobile engines use a four stroke cycle. Classify and explain its operation for each strokes with appropriate diagram. (8 marks)
- (ii) Each cycle (four strokes) of events requires that the engine crankshaft make two complete revolutions. Identified the angle between cylinders of the V-8 engine. (2 marks)
- (b) (i) Design the suitable stroke for four (4) cylinder engine, if the engine has four (4) inch cylinder diameter with 2.5 liter displacement. (4 marks)
- (ii) Compression ratio (CR) is the ratio of the difference in the cylinder volume when the piston is at the bottom of the stroke to the volume in the cylinder above the piston when the piston is at the top of the stroke. The compression ratio of an engine is an important consideration when rebuilding an engine. Predict **THREE (3)** possibilities if the engine have higher compression ratio and another **THREE (3)** possibilities if it has lower compression ratio. (6 marks)
- Q2** (a) Show comparison between a typical gasoline and diesel engine in term of their block and cylinder head materials, compression ratio, peak engine speed and pistons design. (10 marks)
- (b) Distinguish between indirect and direct injection for diesel engine. Sketch the appropriate diagram to support your answer. (8 marks)
- (c) Some technical tip mentioned 'Never allow a diesel engine to run out of fuel'. Support this statement with your justification. (2 marks)
- Q3** (a) Mr. Adam has a new car with original tire's specification 205/75R x 15. He plans to change the tire's size. Formulate **FIVE (5)** factors that Mr. Adam need to consider before he changes the tire's size. (10 marks)

- (b) Select the possible new tire specification in **Table Q3** for Mr. Adam to ensure his selection could remain his old tire overall outside diameter. Show your calculation. (4 marks)
- (c) If Mr. Adam decide to change his new tire bigger than his original specification. Point out **THREE (3)** effect to his vehicle. Explain your answer. (6 marks)
- Q4** (a) Regardless of type, all suspensions use springs that share a common characteristic described by Hooke's Law. Explain the Hooke's Law. Give proper example and appropriate diagram to describe your answer. (6 marks)
- (b) (i) Often method to lower a vehicle by cut off half or more coils of the spring. Technically this method not recommended. Show **THREE (3)** reason why this method is not allowed. (6 marks)
- (ii) Instead of cutting springs to lower a vehicle, show **TWO (2)** preferable methods to lower the vehicle. (2 marks)
- (c) (i) Categorize the strength and handling characteristics of the coil spring. Show your answer with appropriate diagram. (3 marks)
- (ii) 'The spring rate change as the vehicle gets older'. Analyze this statement. (3 marks)
- Q5** (a) Define brakes and describe the sequence of events necessary to stop a vehicle. (6 marks)
- (b) Brake system components can be classified and placed into **SIX (6)** sub-system categories. Illustrate those sub-systems and sketch the typical brake system components. (8 marks)
- (c) List **FOUR (4)** parts of the brake system are specifically regulated under Federal Motor Vehicle Safety Standards (FMVSS) 135 and **TWO (2)** testing procedure included in the FMVSS 135 standard. (6 marks)

-END OF QUESTIONS -

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Table Q3

Inch	Series	Size	Inch	Series	Size	Inch	Series	Size
15	50	195/50R15	16	45	195/45R16	17	40	205/40R17
		175/55R15			205/45R16			215/40R17
	55	185/55R15		50	185/50R16		45	245/40R17
		195/55R15			195/50R16			185/45R17
		155/60R15			205/50R16			205/45R17
		165/60R15		55	185/55R16			215/45R17
		175/60R15			195/55R16			225/45R17
		185/60R15			205/55R16			235/45R17
		195/60R15			215/55R16			245/45R17
		205/60R15			225/55R16			50
	65	145/65R15	60	175/60R16	215/50R17			
		165/65R15		185/60R16	225/50R17			
		175/65R15		195/60R16	245/50R17			
		185/65R15		205/60R16	55	205/55R17		
		195/65R15		215/60R16		215/50R17		
		205/65R15		225/60R16		225/50R17		
	70	195/70R15	65	205/65R16	60	215/60R17		