



Motorcycle Mechanics Institute

Student Scholarship

Examination

Do not write on this test.
There is only one correct answer for each question. Read each question
carefully and select the correct answer on the answer sheet provided.

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1. A carburetor's venturi:
 - A. maintains fuel level
 - B. decreases air velocity near the fuel outlets
 - C. allows easy starting
 - D. increases air velocity near the fuel outlets
2. Which of the following is in contact with the transmission's slider gear and moves it when shifting?
 - A. the shift drum
 - B. the shift fork
 - C. the shift linkage
 - D. the shift plate
3. Sustained pre-ignition causes _____.
 - A. a hole in the piston crown
 - B. broken rings and ring lands
 - C. cracked spark plug insulator
 - D. a fouled spark plug
4. The working range of red *Plastigage®* is:
 - A. 0.001"-0.003"
 - B. 0.004"-0.009"
 - C. 0.003"-0.006"
 - D. 0.002"-0.006"
5. Which gear is shimmed to adjust backlash in a final drive unit of a shaft drive motorcycle?
 - A. the ring gear
 - B. the driveshaft gear
 - C. the spur gear
 - D. the pinion gear
6. The _____ is the area of the valve which contacts the valve seat.
 - A. margin
 - B. face
 - C. tip
 - D. stem
7. If both pointers on a crankshaft truing stand read high 180° from the crankpin, what must be done?
 - A. clamp the crankshaft at the crankpin
 - B. wedge the crankshaft at the crankpin
 - C. wedge the crankshaft 180° from the crankpin
 - D. clamp the crankshaft 180° from the crankpin
8. The ratio of sulfuric acid to water in the electrolyte of a lead-acid battery is called its:
 - A. electrolyte level
 - B. electrolysis
 - C. amp/hours
 - D. specific gravity
9. In a mechanical slide carburetor, where are the bypass ports located?
 - A. under the edge of the choke plate
 - B. between the intake port and the slide
 - C. on the air cleaner side of the slide
 - D. under the edge of the slide
10. A 40:1 premix ratio is reached by adding how many ounces of oil to one gallon of gasoline?
 - A. 1 oz
 - B. 2.3 oz
 - C. 3.2 oz
 - D. 4 oz

11. The primary exhaust emission reduced by oxygenated fuels is:
 - A. carbon dioxide
 - B. oxides of nitrogen
 - C. carbon monoxide
 - D. hydrocarbons
 12. How is a multimeter connected to a circuit to measure current?
 - A. cannot measure current
 - B. in parallel with the circuit
 - C. in series or in parallel, depending on the application
 - D. in series with the circuit
 13. In a 4-stroke engine, valve overlap occurs at the:
 - A. end of the power stroke and the beginning of the exhaust stroke
 - B. end of the exhaust stroke and the beginning of the intake stroke
 - C. end of the intake stroke and the beginning of the compression stroke
 - D. end of the compression stroke and the beginning of the power stroke
 14. The total resistance of a parallel circuit will be:
 - A. equal to the sum of all the resistances
 - B. the same throughout the circuit
 - C. less than the smallest individual resistance
 - D. equal to the volts times the amps
 15. A 2-stroke engine with a leaking ignition side seal will usually:
 - A. run fine
 - B. smoke excessively and foul the spark plug
 - C. run lean, overheat and eventually seize
 - D. hesitate and backfire
 16. Which three basic tests are performed on a DC generator?
 - A. stator resistance, armature test, grounds test
 - B. polarization, maximum output, minimum output
 - C. growler test, opens test, grounds test
 - D. battery load test, rectifier test, polarity
 17. If an exhaust gas analyzer reads high HC but zero CO when troubleshooting a no-start condition, the problem is probably related to:
 - A. compression
 - B. ignition
 - C. richness
 - D. leanness
 18. Which of the following is a symptom of a lean air/fuel mixture?
 - A. primary chain rattle
 - B. black exhaust smoke
 - C. the engine surges at a steady throttle position
 - D. the engine feels sluggish but doesn't hesitate

19. Which of the following is the defining characteristic of a multi-viscosity motor oil?
- A. it absorbs more heat than does a single-viscosity motor oil
 - B. it absorbs less heat than does a single-viscosity motor oil
 - C. it gets less thin with temperature than does a single-viscosity motor oil
 - D. it gets less thick with temperature than does a single-viscosity motor oil
20. Which answer best defines the three things that a two-stroke powerport does?
- A. adjusts port length, width and height
 - B. prevents intake charge spitback
 - C. adjusts port height, width and temperature
 - D. raises and lowers rpm to suit engine load
21. Where are the bypass ports located in a fixed venturi carburetor?
- A. on the airbox side of the venturi
 - B. under the edge of the choke plate
 - C. under the float bowl
 - D. under the edge of the throttle plate
22. Detonation is:
- A. hesitation
 - B. spontaneous combustion after timed ignition
 - C. uncontrolled ignition before timed ignition
 - D. pre-ignition
23. If a CV carburetor has a torn rubber diaphragm, the engine will:
- A. run at a high rpm only
 - B. seize its slide
 - C. idle but have poor throttle response
 - D. run fine but get poor fuel economy
24. What is the cross-sectional height of a tire that is marked “120/80-18”?
- A. 100 mm
 - B. 86 mm
 - C. 80 mm
 - D. 96 mm
25. In a series circuit, the:
- A. current is constant
 - B. wattage is equal to the voltage times the resistance
 - C. current varies with the loads
 - D. voltage is constant
26. A fuel-injected engine combusts better than a carbureted one because:
- A. it gets more air/fuel mixture
 - B. its air/fuel mixture is hotter
 - C. its fuel is atomized more consistently
 - D. its fuel is vaporized more consistently
27. A 360° crankshaft is one with which:
- A. the pistons rise and fall together
 - B. the pistons rise and fall alternately
 - C. the ignition fires every 360°
 - D. the ignition fires every 720°

28. Which one of the following will cause a lean condition?
- A. a plugged fuel tank vent C. high humidity
B. high altitude D. a leaking brass float
29. A motorcycle tire with an "H" speed rating is designed to be safe up to:
- A. 96 mph C. 130 mph
B. 112 mph D. 150 mph
30. Turning a late model idle mixture screw clockwise:
- A. enriches the idle mixture C. leans the idle mixture
B. spreads the rpm range of the idle mixture D. has no effect on the idle mixture
31. Changing the oil height in a motorcycle fork affects its:
- A. damping C. spring preload
B. working air pressure D. static air pressure
32. In motorcycle transmissions:
- A. the gears use synchro rings C. the largest countershaft gear is always 1st gear
B. the gears mesh constantly D. the largest countershaft gear is always top gear
33. In a 2-stroke engine, the exhaust port's timing is controlled by the:
- A. piston skirt C. piston crown
B. piston pin D. piston ring
34. 0.7874" is equal to:
- A. 23.5 mm C. 19 mm
B. 508 mm D. 19.99 mm
35. If an alternator's field coil has shorted, which of these parts will almost always also be damaged?
- A. the stator C. the exciter coil
B. the voltage regulator D. the brushes
36. An AC-CDI ignition system is powered by:
- A. the CDI unit C. the exciter coil
B. the pulser coil D. the battery
37. A plugged carburetor bypass port will cause:
- A. a no-start condition C. a "hunting" idle
B. poor part-throttle acceleration D. lean high rpm operation

38. The purpose of an ignition advance system is to:
- A. advance the ignition timing for starting the motorcycle
 - B. advance the ignition timing to increase the engine rpm
 - C. advance the ignition timing to overcome combustion lag as rpm increases
 - D. advance the charging current with rpm
39. A shock absorber design in which the air and oil are kept separate is called a:
- A. DeCarbon type
 - B. DeVilbiss type
 - C. DeTechnique type
 - D. DeAero type
40. No more than _____ voltage drop should ever be present across a switch or connector.
- A. 0.2 volt
 - B. 0.5 volt
 - C. 2 volt
 - D. 5 volt
41. What does the engine stop switch in an AC-powered ignition system do?
- A. in the “ON” position it connects the primary circuit to chassis ground
 - B. in the “OFF” position it completes the primary circuit
 - C. in the “OFF” position it opens the primary circuit
 - D. in the “OFF” position it connects the primary circuit to chassis ground
42. The method for checking valve spring condition given in modern service manuals is:
- A. spring rate
 - B. spring pressure
 - C. spring length
 - D. spring diameter
43. Which two tools are used to check a charging system's breakeven point?
- A. a voltmeter and an ammeter
 - B. an ohmmeter and an ammeter
 - C. a voltmeter and a tachometer
 - D. an ammeter and a tachometer
44. Why are many motorcycle's pistons wrist pins slightly offset from center?
- A. to make piston installation easier
 - B. to reduce piston slap
 - C. to increase torque
 - D. to center the piston in the cylinder
45. A transmission ratio of 0.944:1 is:
- A. a constant velocity drive
 - B. an overdrive
 - C. a direct-drive
 - D. an underdrive
46. A 250 cc cylinder having a 25 cc combustion chamber has a _____ compression ratio.
- A. 9.0:1
 - B. 10.0:1
 - C. 11.0:1
 - D. 12.0:1
 - E.

47. A voltage drop test is in reality a dynamic _____ test.

A. short circuit C. polarity
B. ground D. resistance

48. What is an indirect fuel injection system?

A. a system whose injectors are in the ports C. a system which has a remote fuel tank
B. a system whose injectors are in the cylinder D. a system whose injectors are in the carburetor

49. An engine's best-power ignition timing is a reliable indicator of its:

A. thermal efficiency C. combustion efficiency
B. compression ratio D. power stroke efficiency

50. Octane is the measurement of a fuel's:

A. thermal energy C. burnability
B. compressibility D. atomizing ability

51. When installing a multi-rate valve spring, the closer coils are installed toward the cylinder head:

A. to maximize spring pressure C. to minimize the valve's weight
B. to minimize spring wear D. to maximize valve sealing

52. A front brake system in which the disc caliper has pistons on one side of the disc only is called a:

A. sliding caliper system C. floating caliper system
B. opposed piston system D. floating disc system

53. In the following VIN, 1HD1BLL1XTY013478, what is the model year?

A. 1996 C. 1998
B. 1997 D. 1999

54. What is the voltage of a 12 volt battery whose cells all read 1.250 specific gravity?

A. 13.2 volts C. 12 volts
B. 12.54 volts D. 12.36 volts

55. What is the total displacement of a twin-cylinder engine whose bore is 93.3 mm and stroke is 3.689"?

A. 78.18 cc C. 99.54 cubic inches
B. 39.09 cubic inches D. 78.18 cubic inches

56. A _____ is used with a telescoping gauge when checking piston-to-cylinder-wall clearance.

A. six inch rule C. micrometer
B. dial bore gauge D. Vernier caliper

57. By how many thousandths of an inch is the reading changed when a 0 – 1 inch micrometer's thimble is rotated two full revolutions ?

A. 0.025 inch C. 0.25 inch
B. 0.050 inch D. 0.50 inch

58. An eddy current dynamometer uses what principle to measure engine horsepower?

A. inertia C. water pressure
B. rpm D. magnetic fields

59. An engine's thermal efficiency refers to:

A. how well it burns the air/fuel mixture C. how far its piston is pushed when the mixture burns
B. how well its cylinder fills with mixture D. how much pressure is made when the mixture burns

60. What is the normal specific gravity of a fully-charged lead-acid battery?

A. 1.026 to 1.028 C. 0.1260 to 0.1280
B. 1.265 to 1.280 D. 12.60 to 12.80

61. Many valves are stellite-plated on their _____ to reduce wear.

A. seats and stems C. faces and tips
B. seats and faces D. stems and tips

62. Another name for a relay is:

A. an SCR C. an electromagnetic switch
B. a diode D. a thermistor

63. A service technician produces 40.5 hours of work for a shop that charges \$60 per hour and pays their technicians a 50% commission. What is the technician's gross pay for that week?

A. \$800 C. \$2000
B. \$1120 D. \$1215

64. Each graduation on a metric micrometer's thimble represents:

A. 0.01 mm C. 0.5 mm
B. 0.001 mm D. 0.05 mm

65. A 12 volt headlight bulb that checks out to 2 ohms will consume _____ watts

A. 5.455 C. 72
B. 26.4 D. 67.85

66. If a piston-port 2-stroke engine's intake port opens at 80° BTDC, it will close at:
- A. 79° BTDC C. 79° ABDC
B. 80° ATDC D. 80° BBDC
67. Magneto and Energy Transfer (ET) are two names for the same ignition system.
- A. True
B. False
68. To calculate the gear ratio for an indirect-drive transmission's 1st gear:
- A. divide the number of teeth on the main-shaft 1st gear by the number of teeth of the countershaft 1st gear
B. multiply the number of teeth on the main-shaft 1st gear by the number of teeth of the countershaft 1st gear
C. divide the number of teeth on the counter-shaft 1st gear by the number of teeth on the mainshaft 1st gear
D. multiply the number of teeth on the counter-shaft 1st gear by the number of teeth on the mainshaft 1st gear
69. A 4-stroke engine's crankshaft rotates _____ per cycle while its camshaft rotates _____.
A. once; once
B. once; twice
C. twice; twice
D. twice; once
70. A final drive system that has a 60 tooth rear sprocket with a 4:1 drive ratio will have a countershaft sprocket with how many teeth?
A. 15 teeth
B. 14 teeth
C. 13 teeth
D. 12 teeth
71. What does the engine stop switch in a DC-powered ignition system do?
- A. in the ON position it connects the primary circuit to chassis ground
B. in the OFF position it completes the primary circuit
C. in the OFF position it opens the primary circuit
D. in the OFF position it connects the primary circuit to chassis ground
72. The largest gear on a 5-speed, indirect-drive transmission's countershaft is:
A. 3rd gear
B. 5th gear
C. 1st gear
D. 4th gear
73. A cracked piston ring land is evidence of:
A. over-revving
B. detonation
C. cylinder out-of-round
D. preignition

74. Each graduation on the thimble of a 1 - 2 inch micrometer is equivalent to:

A. 0.1 inch C. 0.001 inch
B. 0.01 inch D. 0.0001 inch

75. A suspension unit's damping force increases:

A. with the square of its velocity C. with air pressure
B. with the treble of its velocity D. with spring preload

76. A valve train design which uses an additional cam to close the valves is called a _____ system.

A. desmodromic C. shim and bucket
B. double-overhead cam D. overhead valve

77. In a direct-drive transmission, the power flow:

A. goes in on one shaft and leaves on another C. goes in and comes out on the same shaft
B. goes in on one shaft and leaves by a third D. goes through two gears at all times

78. If a 2-stroke pre-mix ratio is changed from 20:1 to 50:1, what happens to the air/fuel mixture?

A. its velocity slows C. it stays the same
B. it becomes richer D. it becomes leaner

79. The hub in a manually-operated wet clutch drives the:

A. drive plates C. mainshaft
B. driven plates D. basket

80. Which multimeter function is used when performing a maximum charging current test?

A. Ω C. VAC
B. $\rightarrow +$ D. DCA

81. A _____ valve seat cutter is used to move the valve seat toward the valve guide.

A. 45° C. 31°
B. 60° D. 46°

82. The "weep" hole on the bottom of a cooling system's water pump is designed to:

A. relieve excess cooling system pressure C. provide an inspection point for the pump
B. provide an air vent D. indicate failure of the internal seal

83. At a constant rpm, when in crankshaft degrees is the piston moving the fastest?

A. at 180° C. at 45°
B. at 40° D. at 90°

84. The two basic principles of exhaust function are:
- A. rpm and horsepower C. back pressure and exhaust valve duration
B. inertia and pulse waves D. rpm and temperature
85. A _____ bearing can support both radial and thrust loads.
- A. roller C. needle
B. ball D. plain
86. A 2-stroke engine's transfer port opens:
- A. BDC C. BBDC
B. BTDC D. ATDC
87. A _____ valve seat cutter is used to move the valve seat toward the combustion chamber.
- A. 45° C. 31°
B. 60° D. 46°
88. As loads are added to a series circuit, its total resistance:
- A. stays the same C. increases
B. decreases D. is equal to the square root of the voltage
89. The most common noise symptom of worn plain bearings is:
- A. whirl C. howl
B. clatter D. knock
90. The _____ allows oil to continue to flow if the oil filter should become clogged.
- A. oil pressure switch valve C. trochoid plunger valve
B. bypass valve D. pressure relief valve
91. Valve overlap has the greatest effect on which emission?
- A. hydrocarbons C. carbon monoxide
B. oxides of nitrogen D. carbon dioxide
92. 70 mm is equal to how many inches?
- A. 1778 C. 219.91
B. 1.778 D. 2.756
93. The gear opposite a fixed or slider gear in a manual direct-drive transmission is always:
- A. a spur gear C. a freewheeling gear
B. a pressed-on gear D. a dogged gear

94. A 13-tooth countershaft sprocket combined with a 39-tooth rear wheel sprocket results in a final drive ratio of:
- A. 1.000:3 C. 13.000:1
B. 3.000:1 D. 1.000:13
95. A rear brake system in which the disc caliper is anchored to the frame instead of the swingarm is a:
- A. sliding caliper system C. floating caliper system
B. opposed piston system D. floating disc system
96. A carburetor:
- A. vaporizes fuel C. atomizes fuel
B. carbonizes fuel D. oxidizes fuel
97. A camshaft's lobe center is:
- A. how far the valve is opened C. distance from mathematical center to BDC
B. distance from mathematical center to TDC D. the same thing as check height
98. Retarding an SOHC 4-stroke engine's camshaft will:
- A. lower the rpm at which the engine makes peak power C. increase valve overlap
B. raise the rpm at which the engine makes peak power D. decrease valve overlap
99. A *Flexhone®* finishing hone is designed to give a cylinder a _____ finish.
- A. plateau C. round
B. polished D. glazed
100. Valve overlap is:
- A. the period when both valves are open C. the total amount of time valve is open
B. the period when both valves are closed D. the total amount of time valve is closed