



# **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  
 B. high altitude  
 C. high humidity  
 D. a leaking brass float
29. A motorcycle tire with an “H” speed rating is designed to be safe up to:
- A. 96 mph  
 B. 112 mph  
 C. 130 mph  
 D. 150 mph
30. Turning a late model idle mixture screw clockwise:
- A. richens the idle mixture  
 B. spreads the rpm range of the idle mixture  
 C. leans the idle mixture  
 D. has no effect on the idle mixture
31. Changing the oil height in a motorcycle fork affects its:
- A. damping  
 B. working air pressure  
 C. spring preload  
 D. static air pressure
32. In motorcycle transmissions:
- A. the gears use synchro rings  
 B. the gears mesh constantly  
 C. the largest countershaft gear is always 1<sup>st</sup> gear  
 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  
 B. piston pin  
 C. piston crown  
 D. piston ring
34. 0.7874” is equal to:
- A. 23.5 mm  
 B. 508 mm  
 C. 19 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  
 B. the voltage regulator  
 C. the exciter coil  
 D. the brushes
36. An AC-CDI ignition system is powered by:
- A. the CDI unit  
 B. the pulser coil  
 C. the exciter coil  
 D. the battery
37. A plugged carburetor bypass port will cause:
- A. a no-start condition  
 B. poor part-throttle acceleration  
 C. a “hunting” idle  
 D. lean high rpm operation

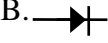
38. The purpose of an ignition advance system is to:
- A. advance the ignition timing for starting the motorcycle
  - B. advance the ignition timing to increase the engine rpm
  - C. advance the ignition timing to overcome combustion lag as rpm increases
  - D. advance the charging current with rpm
39. 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
  - B. ground
  - C. polarity
  - D. resistance
48. What is an indirect fuel injection system?
- A. a system whose injectors are in the ports
  - B. a system whose injectors are in the cylinder
  - C. a system which has a remote fuel tank
  - 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
  - B. compression ratio
  - C. combustion efficiency
  - D. power stroke efficiency
50. Octane is the measurement of a fuel's:
- A. thermal energy
  - B. compressibility
  - C. burnability
  - 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
  - B. to minimize spring wear
  - C. to minimize the valve's weight
  - 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
  - B. opposed piston system
  - C. floating caliper system
  - D. floating disc system
53. In the following VIN, 1HD1BLL1XTY013478, what is the model year?
- A. 1996
  - B. 1997
  - C. 1998
  - D. 1999
54. What is the voltage of a 12 volt battery whose cells all read 1.250 specific gravity?
- A. 13.2 volts
  - B. 12.54 volts
  - C. 12 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
  - B. 39.09 cubic inches
  - C. 99.54 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
  - B. dial bore gauge
  - C. micrometer
  - 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  
B. 0.050 inch  
C. 0.25 inch  
D. 0.50 inch
58. An eddy current dynamometer uses what principle to measure engine horsepower?
- A. inertia  
B. rpm  
C. water pressure  
D. magnetic fields
59. An engine's thermal efficiency refers to:
- A. how well it burns the air/fuel mixture  
B. how well its cylinder fills with mixture  
C. how far its piston is pushed when the mixture burns  
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  
B. 1.265 to 1.280  
C. 0.1260 to 0.1280  
D. 12.60 to 12.80
61. Many valves are stellite-plated on their \_\_\_\_\_ to reduce wear.
- A. seats and stems  
B. seats and faces  
C. faces and tips  
D. stems and tips
62. Another name for a relay is:
- A. an SCR  
B. a diode  
C. an electromagnetic switch  
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  
B. \$1120  
C. \$2000  
D. \$1215
64. Each graduation on a metric micrometer's thimble represents:
- A. 0.01 mm  
B. 0.001 mm  
C. 0.5 mm  
D. 0.05 mm
65. A 12 volt headlight bulb that checks out to 2 ohms will consume \_\_\_\_\_ watts
- A. 5.455  
B. 26.4  
C. 72  
D. 67.85



66. If a piston-port 2-stroke engine's intake port opens at  $80^\circ$  BTDC, it will close at:
- A.  $79^\circ$  BTDC  
 B.  $80^\circ$  ATDC  
 C.  $79^\circ$  ABDC  
 D.  $80^\circ$  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 mainshaft 1st gear by the number of teeth of the countershaft 1st gear  
 B. multiply the number of teeth on the mainshaft 1st gear by the number of teeth of the countershaft 1st gear  
 C. divide the number of teeth on the countershaft 1st gear by the number of teeth on the mainshaft 1st gear  
 D. multiply the number of teeth on the countershaft 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  
B. 0.01 inch  
C. 0.001 inch  
D. 0.0001 inch
75. A suspension unit's damping force increases:
- A. with the square of its velocity  
B. with the treble of its velocity  
C. with air pressure  
D. with spring preload
76. A valve train design which uses an additional cam to close the valves is called a \_\_\_\_\_ system.
- A. desmodromic  
B. double-overhead cam  
C. shim and bucket  
D. overhead valve
77. In a direct-drive transmission, the power flow:
- A. goes in on one shaft and leaves on another  
B. goes in on one shaft and leaves by a third  
C. goes in and comes out on the same shaft  
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  
B. it becomes richer  
C. it stays the same  
D. it becomes leaner
79. The hub in a manually-operated wet clutch drives the:
- A. drive plates  
B. driven plates  
C. mainshaft  
D. basket
80. Which multimeter function is used when performing a maximum charging current test?
- A.  $\Omega$   
B.   
C. VAC  
D. DCA
81. A \_\_\_\_\_ valve seat cutter is used to move the valve seat toward the valve guide.
- A. 45°  
B. 60°  
C. 31°  
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  
B. provide an air vent  
C. provide an inspection point for the pump  
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°  
B. at 40°  
C. at 45°  
D. at 90°

84. The two basic principles of exhaust function are:
- A. rpm and horsepower
  - B. inertia and pulse waves
  - C. back pressure and exhaust valve duration
  - D. rpm and temperature
85. A \_\_\_\_\_ bearing can support both radial and thrust loads.
- A. roller
  - B. ball
  - C. needle
  - D. plain
86. A 2-stroke engine's transfer port opens:
- A. BDC
  - B. BTDC
  - C. BBDC
  - D. ATDC
87. A \_\_\_\_\_ valve seat cutter is used to move the valve seat toward the combustion chamber.
- A.  $45^\circ$
  - B.  $60^\circ$
  - C.  $31^\circ$
  - D.  $46^\circ$
88. As loads are added to a series circuit, its total resistance:
- A. stays the same
  - B. decreases
  - C. increases
  - D. is equal to the square root of the voltage
89. The most common noise symptom of worn plain bearings is:
- A. whirl
  - B. clatter
  - C. howl
  - D. knock
90. The \_\_\_\_\_ allows oil to continue to flow if the oil filter should become clogged.
- A. oil pressure switch valve
  - B. bypass valve
  - C. trochoid plunger valve
  - D. pressure relief valve
91. Valve overlap has the greatest effect on which emission?
- A. hydrocarbons
  - B. oxides of nitrogen
  - C. carbon monoxide
  - D. carbon dioxide
92. 70 mm is equal to how many inches?
- A. 1778
  - B. 1.778
  - C. 219.91
  - D. 2.756
93. The gear opposite a fixed or slider gear in a manual direct-drive transmission is always:
- A. a spur gear
  - B. a pressed-on gear
  - C. a freewheeling 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  
B. 3.000:1  
C. 13.000:1  
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  
B. opposed piston system  
C. floating caliper system  
D. floating disc system
96. A carburetor:
- A. vaporizes fuel  
B. carbonizes fuel  
C. atomizes fuel  
D. oxidizes fuel
97. A camshaft's lobe center is:
- A. how far the valve is opened  
B. distance from mathematical center to TDC  
C. distance from mathematical center to BDC  
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  
B. raise the rpm at which the engine makes peak power  
C. increase valve overlap  
D. decrease valve overlap
99. A *Flexhone*® finishing hone is designed to give a cylinder a \_\_\_\_\_ finish.
- A. plateau  
B. polished  
C. round  
D. glazed
100. Valve overlap is:
- A. the period when both valves are open  
B. the period when both valves are closed  
C. the total amount of time valve is open  
D. the total amount of time valve is closed