

# AGRICULTURE REVIEW

## Agricultural and Biosystems Power, Energy, and Machinery Engineering Reviewer

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Select the best answer for each question. The answer key is provided at the end of this document.

**1. What is the standard power take-off (PTO) speed of most agricultural tractors?**

- A. 300 rpm and 600 rpm
- B. 540 rpm and 1000 rpm
- C. 1500 rpm and 2000 rpm
- D. 100 rpm and 500 rpm

**2. What is the correct sequence of the four strokes in a four-cycle internal combustion engine?**

- A. Intake, Combustion, Exhaust, Intake
- B. Intake, Compression, Power, Exhaust
- C. Suction, Discharge, Power, Exhaust
- D. Intake, Ignition, Power, Exhaust

**3. Which primary tillage implement is designed to cut, lift, and invert the furrow slice to completely bury weeds and crop residues?**

- A. Moldboard plow
- B. Disc harrow
- C. Rotary tiller
- D. Subsoiler

**4. In a four-stroke cycle engine, how many revolutions of the crankshaft are required to complete one full cycle?**

- A. One
- B. Two
- C. Three
- D. Four

**5. Which of the following is considered a renewable energy source derived primarily from organic matter?**

- A. Geothermal
- B. Natural Gas
- C. Biomass
- D. Coal

**6. What is the term for the ratio of the effective field capacity to the theoretical field capacity of an agricultural machine?**

- A. Field efficiency
- B. Tractive efficiency
- C. Application efficiency
- D. Mechanical efficiency

**7. Which device is responsible for mixing air and fuel in the correct proportions in a spark-ignition engine?**

- A. Fuel injector
- B. Carburetor
- C. Turbocharger
- D. Radiator

**8. In a diesel engine, what causes the ignition of the fuel inside the combustion chamber?**

- A. Spark plug
- B. Heat of compression
- C. Glow plug
- D. Carburetor spark

**9. The process of removing moisture from agricultural products down to a safe level for long-term storage is called:**

- A. Cleaning
- B. Milling
- C. Drying
- D. Threshing

**10. A farm machine used to separate the grains from the stalk or panicle of the crop is called a:**

- A. Harvester
- B. Thresher
- C. Planter
- D. Reaper

**11. What is the primary function of a tractor's Roll-Over Protective Structure (ROPS)?**

- A. To protect the engine from dirt
- B. To increase the traction of the rear wheels
- C. To protect the operator in case the tractor overturns
- D. To provide shade for the operator

**12. Which of the following implements is considered a secondary tillage equipment?**

- A. Moldboard plow
- B. Chisel plow
- C. Subsoiler
- D. Disc harrow

**13. Solar panels convert sunlight directly into electricity using which type of cells?**

- A. Galvanic cells
- B. Photovoltaic cells
- C. Electrolytic cells
- D. Fuel cells

**14. The total volume swept by the piston as it moves from Top Dead Center (TDC) to Bottom Dead Center (BDC) is known as:**

- A. Clearance volume
- B. Piston displacement
- C. Compression volume
- D. Chamber volume

**15. The transfer of heat through a solid material is referred to as:**

- A. Conduction
- B. Convection
- C. Radiation
- D. Insulation

**16. What is the standard unit of electrical power?**

- A. Joule
- B. Ampere
- C. Volt
- D. Watt

**17. Biogas produced from the anaerobic digestion of animal manure is primarily composed of carbon dioxide and:**

- A. Hydrogen sulfide
- B. Methane
- C. Propane
- D. Butane

**18. A machine that simultaneously reaps, threshes, and cleans the grain in a single field operation is known as a:**

- A. Reaper-binder
- B. Combine harvester
- C. Tractor-thresher
- D. Stripper harvester

**19. Which part of the moldboard plow cuts the furrow slice horizontally?**

- A. Moldboard
- B. Coulter
- C. Share
- D. Landside

**20. What type of agricultural pump is most commonly used for high-volume, low-head irrigation applications?**

- A. Piston pump
- B. Centrifugal pump
- C. Diaphragm pump
- D. Rotary gear pump

**21. The energy derived from the kinetic energy of flowing or falling water is called:**

- A. Geothermal energy
- B. Hydropower
- C. Tidal energy
- D. Wave energy

**22. What is the term used for the minimum wind speed at which a wind turbine begins to generate usable power?**

- A. Rated speed
- B. Cut-out speed
- C. Cut-in speed
- D. Survival speed

**23. Which standard governs the specifications and testing of agricultural machinery in the Philippines?**

- A. PNS
- B. PAES
- C. ISO
- D. ASAE

**24. In agricultural machinery, what does 'draft' refer to?**

- A. The speed of the implement
- B. The horizontal force required to pull the implement
- C. The vertical weight of the implement
- D. The depth of operation

**25. The standard firing order of a four-cylinder, inline four-stroke engine is typically:**

- A. 1-2-3-4
- B. 1-4-3-2
- C. 1-3-4-2
- D. 4-3-2-1

**26. The angle of the disc of a disc plow inclined from the vertical is called the:**

- A. Tilt angle
- B. Disc angle
- C. Draft angle
- D. Clearance angle

**27. Heat transfer caused by the physical movement of a fluid (liquid or gas) is known as:**

- A. Conduction
- B. Convection
- C. Radiation
- D. Emission

**28. Which tractor system is designed to provide auxiliary hydraulic or mechanical power to stationary or trailed implements?**

- A. Transmission system
- B. Differential system
- C. Power Take-Off (PTO)
- D. Drawbar system

**29. To prevent an internal combustion engine from overheating, excess heat must be continuously removed by the:**

- A. Lubrication system
- B. Exhaust system
- C. Cooling system
- D. Fuel system

**30. The process of producing two or more forms of useful energy (such as electricity and heat) from a single fuel source is called:**

- A. Fermentation
- B. Cogeneration
- C. Gasification
- D. Pyrolysis

**31. What is the primary function of the tractor differential?**

- A. To cool the engine oil
- B. To allow the rear wheels to rotate at different speeds when turning
- C. To transfer power to the PTO
- D. To increase the drawbar pull

**32. A device used to uniformly apply granular fertilizers over a field is known as a:**

- A. Seed drill
- B. Row crop planter
- C. Broadcast spreader
- D. Transplanter

**33. What type of agricultural tractor is steered by changing the speed or direction of the left and right tracks independently?**

- A. Four-wheel drive tractor
- B. Crawler tractor
- C. Articulated tractor
- D. Two-wheel tractor

**34. The distance between the left and right wheels of a tractor is called the:**

- A. Wheelbase
- B. Ground clearance
- C. Wheel tread
- D. Turning radius

**35. Which law of thermodynamics establishes the principle of conservation of energy?**

- A. Zeroth Law
- B. First Law
- C. Second Law
- D. Third Law

**36. If a 2.5-meter wide combine harvester operates at a forward speed of 4 km/hr, what is its theoretical field capacity?**

- A. 0.10 ha/hr
- B. 1.00 ha/hr
- C. 2.50 ha/hr
- D. 10.0 ha/hr

**37. An internal combustion engine has a clearance volume of 50 cc and a piston displacement (swept volume) of 450 cc. What is its compression ratio?**

- A. 8:1
- B. 9:1
- C. 10:1
- D. 11:1

**38. A machine has a theoretical field capacity of 1.5 ha/hr and an effective field capacity of 1.2 ha/hr. What is its field efficiency?**

- A. 70%
- B. 75%
- C. 80%
- D. 85%

**39. For a ground-driven seed drill, how does an increase in the forward speed of the tractor generally affect the seeding rate per hectare (assuming no slippage)?**

- A. It significantly increases the seeding rate.
- B. It significantly decreases the seeding rate.
- C. It has no significant effect on the seeding rate.
- D. It doubles the seeding rate.

**40. Which ideal thermodynamic cycle is the theoretical basis for a spark-ignition (gasoline) engine?**

- A. Diesel cycle
- B. Rankine cycle
- C. Brayton cycle
- D. Otto cycle

**41. Calculate the draft of a 4-bottom moldboard plow with 30 cm width per bottom, operating at a depth of 20 cm. The specific draft of the soil is 5 N/cm<sup>2</sup>.**

- A. 10.0 kN
- B. 12.0 kN
- C. 14.5 kN
- D. 16.0 kN

**42. What is the standard atmospheric pressure at sea level expressed in kilopascals (kPa)?**

- A. 98.1 kPa
- B. 100.0 kPa
- C. 101.325 kPa
- D. 14.7 kPa

**43. The compression ratio of a typical diesel engine generally falls within which of the following ranges?**

- A. 6:1 to 10:1
- B. 14:1 to 24:1
- C. 4:1 to 8:1
- D. 25:1 to 35:1

**44. A solar photovoltaic panel produces 150 W of power. If it operates effectively for 6 hours a day, what is the total energy generated in Watt-hours (Wh)?**

- A. 600 Wh
- B. 750 Wh
- C. 900 Wh
- D. 1500 Wh

**45. Determine the required operating speed of a planter if the theoretical field capacity is 0.6 ha/hr and its effective operating width is 1.5 meters.**

- A. 3.0 km/hr
- B. 4.0 km/hr
- C. 5.0 km/hr
- D. 6.0 km/hr

**46. The efficiency with which a tractor converts engine axle power to drawbar power to pull implements is referred to as:**

- A. Transmission efficiency
- B. Tractive efficiency
- C. Thermal efficiency
- D. Volumetric efficiency

**47. A centrifugal irrigation pump discharges 60 liters per second against a total head of 10 meters. Assuming water density is 1000 kg/m<sup>3</sup> and gravity is 9.81 m/s<sup>2</sup>, what is the approximate water power?**

- A. 3.5 kW
- B. 4.2 kW
- C. 5.9 kW
- D. 7.5 kW

**48. In grain drying operations, the moisture content for commercial trading is most commonly expressed on a:**

- A. Dry basis
- B. Wet basis
- C. Volume basis
- D. Mass-to-volume ratio

**49. A 4-stroke, 4-cylinder engine has a cylinder bore of 10 cm and a stroke of 10 cm. What is the total piston displacement of the engine?**

- A. 3,141.6 cc
- B. 785.4 cc
- C. 1,570.8 cc
- D. 4,215.2 cc

**50. A 3-bottom plow with a 30 cm width per bottom operates at a speed of 5 km/hr. The specific draft of the soil is 6 N/cm<sup>2</sup> and the depth of cut is 15 cm. What is the minimum drawbar power required to pull the plow?**

- A. 11.25 kW
- B. 8.10 kW
- C. 15.50 kW
- D. 22.50 kW

# Answer Key

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Q1. **B**

Q2. **B**

Q3. **A**

Q4. **B**

Q5. **C**

Q6. **A**

Q7. **B**

Q8. **B**

Q9. **C**

Q10. **B**

Q11. **C**

Q12. **D**

Q13. **B**

Q14. **B**

Q15. **A**

Q16. **D**

Q17. **B**

Q18. **B**

Q19. **C**

Q20. **B**

Q21. **B**

Q22. **C**

Q23. **B**

Q24. **B**

Q25. **C**

Q26. **A**

Q27. **B**

Q28. **C**

Q29. **C**

Q30. **B**

Q31. **B**

Q32. **C**

Q33. **B**

Q34. **C**

Q35. **B**

Q36. **B**

Q37. **C**

Q38. **C**

Q39. **C**

Q40. **D**

Q41. **B**

Q42. **C**

Q43. **B**

Q44. **C**

Q45. **B**

Q46. **B**

Q47. **C**

Q48. **B**

Q49. **A**

Q50. **A**