# Engineering Thermodynamics I

## Week 15

## Assessments
## Final Exam Answer Key

**Lecturer:** Dr. Melaku Desta

# Multiple Choice Questions

## Answer Key for Multiple Choice Questions:

| | | | |
|---|---|---|---|
| 1. C | 11. A | 21. B | 31. B |
| 2. B | 12. B | 22. B | 32. D |
| 3. C | 13. A | 23. D | 33. B |
| 4. C | 14. B | 24. D | 34. A |
| 5. B | 15. A | 25. B | 35. D |
| 6. B | 16. C | 26. C | 36. E |
| 7. C | 17. A | 27. D | 37. B |
| 8. C | 18. A | 28. A | 38. D |
| 9. B | 19. A | 29. B | 39. B |
| 10. C | 20. B | 30. A | 40. B |

# Answer for Short Answer Questions

1. The Otto cycle is used in gasoline engines because it operates on a spark ignition principle, where a fuel-air mixture is compressed and ignited by a spark plug. The Diesel cycle relies on compression ignition, requiring higher compression ratios, which would make gasoline engines inefficient and prone to engine knock.

# Answer for Short Answer Questions

2. The Rankine cycle is used in steam power plants, where water undergoes phase changes between liquid and vapor, while the Brayton cycle is used in gas turbines and jet engines, operating entirely with gases without phase change.

# Answer for Short Answer Questions

3. The COP of a refrigeration cycle is often greater than 1 because it measures the ratio of cooling effect to work input, rather than work output to heat input. Since refrigeration cycles move energy rather than directly convert it to work, their COP can be much higher than a heat engine’s efficiency.

# Answer for Short Answer Questions

4. The Carnot cycle represents the idealized maximum efficiency for any heat engine, based only on the temperature difference between the heat source and sink. Real-world cycles (such as Rankine and Otto) have irreversibilities like friction and heat losses that reduce efficiency compared to the Carnot cycle.

Thank you !