※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Two wooden blocks are resting on a frictionless table. The masses of the blocks are 4 kg and 6 kg. The 6 kg is pushed against the 4 kg block by a 20 N force. Please answer: (a) What is the acceleration of the two blocks together? (b) What is the acceleration of the 4 kg block? (c) What is the total force acting on the 4 kg block? (d) What is the total force acting on the 6 kg block? **(15%)**

2. Three resistors, with resistance of 10Ω, 20Ω, and 30Ω are connected to a 12V DC power supply in series. Please answer: (a) Draw a circuit diagram for this circuit. (b) What is the total resistance? (c) What current will flow in the circuit? (d) What current will flow through the 20Ω resistor? (d) What will be the potential difference across the 20Ω resistor? **(15%)**

3. Please describe and explain (a) Mean free Path, (b) Curie temperature, (c) Blackbody radiation, (d) Semiconductor, (e) Maxwell's equation. **(20%)**

4. Describe and sketch Carnot cycle. **(10%)**

5. State the following laws and explain with examples in a baseball game. (a) Newton's first law of motion. (b) Newton's second law of motion. (c) Newton's third law of motion. (d) Newton's universal law of gravity. (e) the law of conservation of energy. **(20%)**

6. Explain the nature of light with the particle theory and the wave theory. **(10%)**

7. What is the Band theory of solids? **(10%)**