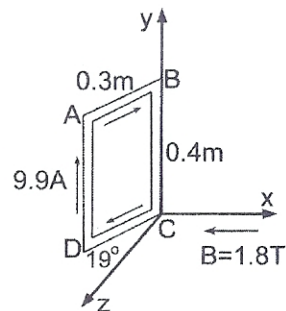


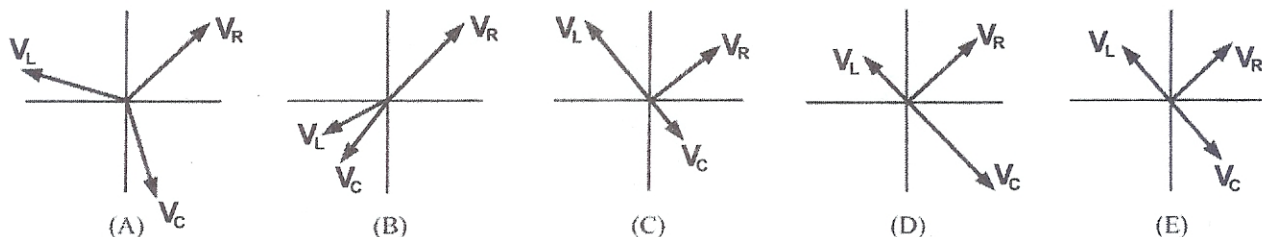
18. A rigid rectangular loop, which measures 0.30 m by 0.40 m, carries a current of 9.9 A, as shown in right figure. A uniform external magnetic field of magnitude 1.8 T in the negative x-direction is present. Segment CD is in the x-z plane and forms 19° with the z-axis.



The y-component of the magnetic force on segment AB is closest to:

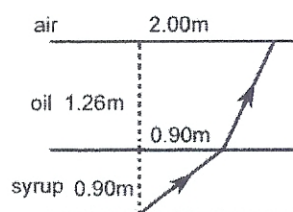
- (A) zero (B) -5.1 N (C) -1.7 N (D) +5.1 N (E) +1.7 N.

19. In the following figures, which of the phasor diagrams represents a series RLC circuit driven at resonance?



20. A tank holds a layer of oil, 1.26 m thick, which floats on a layer of syrup that is 0.9 m thick.

Both liquids are clear and do not intermix. A ray from the bottom of the tank crosses the oil-syrup interface at a point 0.90 m from the axis. The ray arrives at the oil-air interface, 2.00 m from the axis and at the critical angle, as shown in right figure. The index of refraction of the syrup is closest to: (A) 1.62 (B) 1.41 (C) 1.85 (D) 2.06 (E) 1.29.



(乙) 複選題 (總共 10 題, 每題 4%, 不倒扣, 答案有一至五個)

21. 選出正確的敘述: (A)波從輕弦入射重弦,則反射波與入射波反向(out of phase), (B)波從重弦入射輕弦,則反射波與入射波同向(in phase), (C)波的振幅加倍,則傳遞的功率增大四倍, (D)弦的線密度減半,則傳遞的功率也減半, (E)弦的張力加倍,則傳遞的功率也加倍。
22. 實際的彈簧並不遵守 Hooke's law: $F_x = -kx$, 而是類似 $F_x = -kx + ax^2 - bx^3$ (k, a 與 b 都是大於零的常數)。一端固定的實際彈簧, 如外力作用在另一端, 使此自由端的位移從 $x = 0$ 到 $x = c, c > 0$, 外力作功 W , 則(A)此時彈簧也作功 W , (B)如彈簧自由端的位移從 $x = 0$ 到 $x = -c$, 則彈簧作功 $-W$, (C)彈簧自由端的位移在 $x = c$, 儲存在彈簧的位能 $= W$, (D)彈簧自由端的位移在 $x = -c$ 時, 儲存在彈簧的位能大於 W , (E)外力拉長與壓縮彈簧相同距離所作的功相同。
23. 質量分別為 m_1, m_2 的物體($m_1 > m_2$), 靜止於無摩擦力的表面上, m_1 與 m_2 受同樣的作用力作用相同的一段時間後, 如 $p =$ 動量, $K =$ 動能, 則(A) $p_1 > p_2$, (B) $p_1 < p_2$, (C) $K_1 > K_2$, (D) $K_1 = K_2$, (E) $K_1 < K_2$ 。