

1. 進行革藍氏染色時用何種染料？如何判定其為陰性或陽性反應？(6%)
2. 比較說明下列名詞(24%)
  - (1). ascospore vs. endospore
  - (2). microaerophile vs. facultative anaerobe
  - (3). thermal death time vs. decimal reduction time
  - (4). conjugation vs. transduction
  - (5). facilitated diffusion vs. simple diffusion
  - (6). Alexander Fleming vs. Louis Pasteur
3. 說明 transcription 與 translation (10%)
4. 相對於 plate count method 以 direct microscopic method 計數菌數有何優缺點((10%)
5. 請寫出下列學者在微生物學之貢獻(12%)：(1). David H. Bergey (2). Robert Koch (3). Anton van Leeuwenhoek (4). James Watson
6. (1). 請寫出並簡單說明，在自然界中細菌可利用哪些方式進行遺傳物質之重組(recombination)? (6%) (2). 在實驗室中學者可利用哪些方式進行微生物之基因工程改造(genetic engineering)? (6%)
7. Exactly  $2.0 \times 10^5$  bacteria with a generation time of 40 minutes are introduced into 100 ml of fresh nutrient broth at 8:00 A.M. and maintained at an optimum incubation temperature throughout the day. How many bacteria are present at 4:00 P.M.? How many generations will take place by 6:00 P.M.? (10%)
8. Please describe *lac* operon model, developed by Jacob and Monod, to explain when *E. coli* is cultured in media containing glucose and lactose, the utilization of lactose and synthesis of  $\beta$ -galactosidase are inhibited by glucose. (10%)
9. Compare the cell wall of Gram (+) and Gram (-) bacteria. (6%)