**Appendix A−Detailed Content Outline**

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| ***Healthcare Facilities Design Professional******Certification Examination Content Outline*** **Addressed Lightly Mentioned** | ***Complexity Level and Number of Items*** |
| ***Recall*** | ***Application*** | ***Analysis*** | ***TOTALS*** |
| ***I. MEDICAL BACKGROUND INFORMATION*** | ***6*** | ***8*** | ***0*** | ***14*** |
| ***A. Terminology*** |  |  |  |  |
| 1. Recognize relevant medical terms (e.g., immune compromise). |  |  |  |  |
| 2. Demonstrate understanding of various healthcare occupancy types. |  |  |  |  |
| ***B. Equipment*** |  |  |  |  |
| 1. Describe relationship of medical equipment to HVAC design. |  |  |  |  |
| 2. Identify basic medical equipment. |  |  |  |  |
| ***C. Departments and Medical Procedures*** |  |  |  |  |
| 1. Apply understanding of medical procedures to room designs. |  |  |  |  |
| 2. Apply HVAC design to medical functional areas. |  |  |  |  |
| ***D. Airborne vs. Contact Infection and Contamination*** |  |  |  |  |
| 1. Distinguish between airborne and contact transmission of pathogens. |  |  |  |  |
| 2. Demonstrate understanding of transmission, infection, and diseases. |  |  |  |  |
| ***E. Common Disease Organisms*** |  |  |  |  |
| 1. Describe conditions of growth of disease organisms. |  |  |  |  |
| ***F. Contamination of Domestic Water Supply*** |  |  |  |  |
| 1. Evaluate conditions under which pathogens grow. |  |  |  |  |
| 2. Describe known amplification sites for pathogens. |  |  |  |  |
| 3. Identify control methods for limiting pathogen growth. |  |  |  |  |
| ***II. STANDARDS and GUIDELINES for HVAC SYSTEM DESIGN for HEALTHCARE FACILITIES*** | ***17*** | ***0*** | ***0*** | ***17*** |
| ***A. Standards and Guidelines: Standard 170- 2017*** |  |  |  |  |
| 1. Recognize common standards from ASHRAE. |  |  |  |  |
| 2. Recognize common guidelines. |  |  |  |  |
| 3. Recognize the requirements of the appropriate accreditation organization. |  |  |  |  |
| ***B. Regulatory Codes*** |  |  |  |  |
| 1. Demonstrate understanding of ASHRAE energy code requirements. |  |  |  |  |
| 2. Recognize the requirements of local authorities and the effect on design. |  |  |  |  |

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| ***Healthcare Facilities Design Professional******Certification Examination Content Outline*** | ***Complexity Level and Number of Items*** |
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| ***III. HVAC SYSTEM DESIGN for HEALTHCARE FACILITIES*** | ***7*** | ***21*** | ***7*** | ***35*** |
| ***A. Static Pressure Control*** |  |  |  |  |
| 1. Identify types of rooms that require static pressure control. |  |  |  |  |
| 2. Apply methods to accomplish static pressure control. |  |  |  |  |
| 3. Describe methods for measurement, notification, and documentation of static pressure control. |  |  |  |  |
| ***A. Energy Efficiency*** |  |  |  |  |
| 1. Determine inefficiencies in healthcare system design. |  |  |  |  |
| 2. Apply aspects of energy efficiency specific to healthcare. |  |  |  |  |
| 3. Describe exemptions from the energy standard. |  |  |  |  |
| 4. Demonstrate knowledge of limitations of energy saving strategies. |  |  |  |  |
| 5. Demonstrate understanding of variable volume system application. |  |  |  |  |
| 6. Demonstrate knowledge of energy use and management. |  |  |  |  |
| 7. Articulate energy recovery technologies. |  |  |  |  |
| ***C. Room Air Distribution*** |  |  |  |  |
| 1. Design systems with proper air flows and pressurizations. |  |  |  |  |
| 2. Calculate air flow rates to comply with room air change rates. |  |  |  |  |
| 3. Demonstrate understanding of the fundamentals of diffuserplacement. |  |  |  |  |
| 4. Diagnose improper room air distribution and pressurization. |  |  |  |  |
| 5. Describe psychometric sensor placement. |  |  |  |  |
| ***D. Equipment and Application*** |  |  |  |  |
| 1. Demonstrate knowledge of air handling systems design. |  |  |  |  |
| 2. Identify security concerns related to HVAC. |  |  |  |  |
| 3. Locate equipment. |  |  |  |  |
| 4. Demonstrate knowledge of psychrometric principles. |  |  |  |  |
| ***IV. UNIQUE REQUIREMENTS for HEALTHCARE FACILITIES*** | ***14*** | ***20*** | ***0*** | ***34*** |
| ***A. Central Plants - Describe need for redundancy to current standards.*** |  |  |  |  |
| ***B. Medical Equipment*** |  |  |  |  |
| 1. Demonstrate understanding of contribution to loads. |  |  |  |  |
| 2. Demonstrate understanding of special HVAC requirements. |  |  |  |  |
| 3. Describe major diagnostic and treatment equipment. |  |  |  |  |
| 4. Describe application of sterilizers. |  |  |  |  |

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| ***C. Fire and Life Safety*** *(including smoke control)* |  |  |  |  |
| 1. Describe smoke management requirements for healthcare facilities (e.g., OR and patient room). |  |  |  |  |
| 2. Demonstrate understanding of ventilation system requirements for medical gas storage areas. |  |  |  |  |
| 3. Demonstrate understanding of healthcare facility compartmentalization. |  |  |  |  |
| ***D. Operations and Maintenance*** |  |  |  |  |
| 1. Maintain equipment accessibility. |  |  |  |  |
| 2. Maintain functionality during maintenance. |  |  |  |  |
| 3. Demonstrate understanding of healthcare facility operations. |  |  |  |  |
| 4. Describe consequences of continuity of service. |  |  |  |  |
| 5. Prescribe procedures for abnormal operation conditions. |  |  |  |  |
| ***E. Infection Control*** |  |  |  |  |
| 1. Describe the primary elements of an ICRA process. |  |  |  |  |
| 2. Describe the role of the HVAC designer in the ICRA process. |  |  |  |  |
| 3. Demonstrate understanding of how the ICRA affects mechanical specifications. |  |  |  |  |
| 4. Demonstrate understanding of the various ICRA engineering controls used during construction. |  |  |  |  |
| 5. Demonstrate understanding of contamination control. |  |  |  |  |
| 6. Describe strategies for epidemiology related to HVAC. |  |  |  |  |
| ***F. Disaster Mitigation, Management, and Recovery*** |  |  |  |  |
| 1. Demonstrate understanding of design contingencies following utility system failure. |  |  |  |  |
| 2. Evaluate needs following catastrophic events. |  |  |  |  |
| 3. Demonstrate understanding of current literature. |  |  |  |  |
| 4. Demonstrate understanding of hazard vulnerability analysis. |  |  |  |  |
| ***G. Controls and Instrumentation*** |  |  |  |  |
| 1. Demonstrate understanding of HVAC system monitoring strategies. |  |  |  |  |
| 2. Demonstrate understanding of room pressure controls. |  |  |  |  |
| 3. Monitor mechanical, electrical, and fire shut down controls. |  |  |  |  |
| 4. Monitor temperature and humidity controls. |  |  |  |  |

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| ***H. Testing, Balancing, and Commissioning*** |  |  |  |  |
| 1. Demonstrate understanding of existing conditions prior to renovation. |  |  |  |  |
| 2. Recognize performance metrics of commissioning. |  |  |  |  |
| 3. Describe test procedures for commissioning various areas requiring unique pressure relationships. |  |  |  |  |
| 4. Demonstrate understanding of various control sequences. |  |  |  |  |
| ***Totals*** | ***44*** | ***49*** | ***7*** | ***100*** |