# Lesson Plan

**Subject : Refrigeration and Air Conditioning (MEP-310A)**

**Lesson plan Duration : 15 Weeks**

**Work load (Lecture/Tutorial/Practical) per week**: L / T / P: 3 / 2 / 4 (Hrs)

| Lecture No | Theory | Practical | |
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| | | Practical Day | Topic |
| 1 | Brief detail regarding syllabus and overview of subject, books required | 1 | To study and perform experiment on basic vapour compression refrigeration cycle. |
| 2 | **Unit1:** Basics of heat pump & refrigerator, Carnot refrigeration and heat pump | | |
| 3 | Units of refrigeration, COP of refrigerator and heat pump | | |
| 4 | Carnot COP, Ice refrigeration, evaporative refrigeration | | |
| 5 | Refrigeration by expansion of air, refrigeration by throttling of gas, vapour refrigeration system | 2 | To find C.O.P. of water cooler. |
| 6 | Steam jet refrigeration, thermo- electric cooling, adiabatic demagnetization | | |
| 7 | Air refrigeration: Basic principle of operation of air refrigeration system | | |
| 8 | Bell Coleman air refrigerator | | |
| 9 | Numerical Problems | 3 | To study and perform experiment on vapour absorption apparatus. |
| 10 | Advantages of using air refrigeration in air craft, disadvantage of air refrigeration in comparison to other cold producing methods, | | |
| 11 | Simple air refrigeration in air craft, simple evaporative type, air refrigeration in air craft, necessity of cooling the aircraft | | |
| 12 | Numerical problems on Simple air refrigeration and evaporative type air refrigeration | | |
| 13 | **Unit-II: Simple vapour compression refrigeration system:** Introduction to Simple vapour compression refrigeration system, | 4 | To find the performance parameter of cooling tower. |
| 14 | Different compression processes (wet, dry and saturated Compression, superheated compression), | | |
| 15 | Limitations of vapour compression refrigeration system if used on reverse Carnot cycle, representation of theoretical and actual cycle on T-S and P-H charts. | | |

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| 16 | Effects of operating conditions on the performance of the system. | | |
| 17 | Advantages of vapour compression system over air refrigeration system. | 5 | To study various components in room air conditioner |
| 18 | **Advanced vapour compression refrigeration system:** Methods of improving COP, flash chamber, flash inter cooler, optimum inter stage pressure for two stage Refrigeration system | | |
| 19 | Single expansion and multi expansion cases, basic introduction of single load and multi load systems, Cascade systems. | | |
| 20 | **Vapour absorption refrigeration system and special topics:** Basic absorption system, COP and maximum COP of the absorption system. Actual $NH_3$ absorption system | 6 | To find RH of atmospheric air by using Sling Psychrometer. |
| 21 | Function of various components, Li-Br absorption system, Selection of refrigerant and absorbent pair in vapour absorption system, Electro-Lux refrigerator, comparison of | | |
| 22 | Compression and absorption refrigeration system, Nomenclature of refrigerants, desirable properties of refrigerants, cold storage and Ice Plants. | | |
| 23 | **UNIT-III : Introduction:** Difference between refrigeration and Air-conditioning, Psychrometric properties of moist air (wet bulb, dry bulb, dew point temperature, relative and specific humidity, temperature of adiabatic saturation | | |
| 24 | Empirical relation to calculate $P_v$ of moist air. | 7 | To study different control devices of a refrigeration system |
| 25 | Psychometric chart, construction and use, mixing of two air streams, | | |
| 26 | Sensible heating and cooling, latent heating and cooling, humidification and dehumidification, cooling with dehumidification | | |
| 27 | Cooling with adiabatic humidification, heating and humidification, By- pass factor of coil, sensible heat factor, ADP of cooling coil, Air washer. | | |
| 28 | **UNIT-IV** **Air-conditioning Systems:** Classification, factors affecting air-conditioning systems, comfort air-conditioning system, winter air-conditioning system, | 8 | To find the performance of a refrigeration test rig system by using different expansion devices. |
| 29 | Summer air-conditioning system, year round air-conditioning system, , | | |

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| 30 | Unitary air-conditioning system, central air-conditioning system | | |
| 31 | Room sensible heat factor, Grand sensible heat factor, effective room sensible heat factor | | |
| 32 | **Cooling Load calculation:** Inside design conditions, comfort conditions, components of cooling load, | 9 | |
| 33 | Internal heat gains (occupancy, lighting, appliances, product and processes), | | |
| 34 | system heat gain (supply air duct, A.C. fan, return air duct), | | |
| 35 | . External heat gain (heat gain through building, solar heat gain through outside walls and roofs), | | |
| 36 | solar temperature, solar heat gain through glass windows, heat gain due to ventilation and infiltration | 10 | |
| 37 | **Industrial and Commercial Application:** Transport air conditioning | | |
| 38 | Evaporative condensers, | | |
| 39 | Cooling towers, | | |
| 40 | Heat pumps | | |