**SAMPLE QUESTION BANK**

**Program: BE (Mechanical Engineering)**

Curriculum Scheme: **Rev 2016**

**BE Semester VIII**

Course Code: MEC 803 and Course Name: Power Engineering

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**MCQ- SAMPLE SET**

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| 1. | The heat of combustion of a fuel |
| Option A: | Is always negative. |
| Option B: | Is equal to the heat of formation. |
| Option C: | Can't be known without calculating it. |
| Option D: | Is always positive. |
|  |  |
| 2. | Proximate analysis of coal determines its \_\_\_\_\_\_\_\_\_\_ content. |
| Option A: | Moisture, ash, Sulphur & volatile matter. |
| Option B: | Moisture, volatile matter, ash & fixed carbon. |
| Option C: | Moisture, Sulphur, nitrogen & fixed carbon. |
| Option D: | Moisture, Sulphur nitrogen & fixed carbon. |
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| 3. | Difference between impulse and reaction turbine |
| Option A: | impulse turbine only pressure energy converted into work but in reaction turbine pressure and kinetic energy converted to work |
| Option B: | impulse turbine only pressure energy converted into work but in reaction turbine kinetic energy converted to work |
| Option C: | impulse turbine only kinetic energy converted into work but in reaction turbine pressure and kinetic energy converted to work |
| Option D: | impulse turbine only kinetic energy converted into work but in reaction turbine pressure converted to work |
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| 4. | which is not part of velocity triangle in reaction turbine |
| Option A: | Guide blade angle |
| Option B: | Vane angle at inlet |
| Option C: | vane angle at outlet |
| Option D: | velocity of steam after nozzle |
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| 5. | Fusible plug is used for |
| Option A: | to extinguish Fire in Furness |
| Option B: | to control pressure |
| Option C: | to control water level |
| Option D: | to control steam generation |
|  |  |
| 6. | Feed check valve used for |
| Option A: | to control Feed water |
| Option B: | to Control Pressure of feed steam |
| Option C: | TO control Velocity Of steam |
| Option D: | To control fuel supply to boiler |
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| 7. | The air standard cycle for a Gas-Turbine called as |
| Option A: | Reheat cycle |
| Option B: | Rankine cycle |
| Option C: | Brayton cycle |
| Option D: | Diesel cycle |
|  |  |
| 8. | The main component of gas turbine plant is |
| Option A: | Compressor |
| Option B: | condenser |
| Option C: | Boiler |
| Option D: | Both Compressor & Boiler |
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| 9. | The percentage ratio of total energy at inlet with net work output of the cycle is |
| Option A: | Engine Efficiency |
| Option B: | Combustion efficiency |
| Option C: | Thermal efficiency |
| Option D: | Compression efficiency |
|  |  |
| 10. | Which of the following statements are correct about the regenerative gas turbine   1. Decrease the fuel requirement for same work output. 2. ɳregen=ɳcarnot at pressure ratio = 1 3. Increase the temperature of partially expanded gases by burning more fuel. 4. Increase the pressure ratio of the cycle. |
| Option A: | 2,3 and 4 |
| Option B: | 2 and 4 |
| Option C: | 3 and 4 |
| Option D: | 1 and 2 |
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| 11. | Single stage impulse turbine has equal blade angles and nozzle angle of 180 . If the blade velocity coefficient is 0.82, then the maximum possible blade efficiency \_\_\_\_% |
| Option A: | 82 |
| Option B: | 84 |
| Option C: | 86 |
| Option D: | 88 |
|  |  |
| 12. | In forced circulation type boiler |
| Option A: | Heating takes place at bottom and the water supplied at bottom and the water supplied at bottom gets converted into mixture of steam bubbles and hot water which rises to drum. |
| Option B: | Water is supplied in drum and through down comers located in atmospheric condition it passes to the water wall and rises to drum in the form of mixture of water and steam |
| Option C: | Feed pump is employed to supplement natural circulation in water wall type furnace |
| Option D: | Water is converted into steam in one pass without any re-circulation. |
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| 13. | If the enthalpy drop in the moving blades and fixed blades of a steam turbine is 10 kJ/kg and 15 kJ/kg respectively then what is the degree of reaction? |
| Option A: | 67% |
| Option B: | 60% |
| Option C: | 40% |
| Option D: | 33% |
|  |  |
| 14. | In velocity compounding, steam is passed through |
| Option A: | fixed nozzle-moving blades-fixed blades-moving blades |
| Option B: | fixed nozzle-moving blades-fixed nozzles-moving blades |
| Option C: | moving blades-fixed nozzles- fixed blades-moving blades |
| Option D: | fixed blades-moving blades-fixed nozzles- moving blades |
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| 15. | The impeller of a centrifugal pump has an external diameter of 450mm and internal diameter of 200mm and it runs at 1440 rpm. Assuming constant radial flow through the impeller at 2.5m/s. Determine inlet vane angle. |
| Option A: | 9.4 Degree |
| Option B: | 8.5 Degree |
| Option C: | 10.5 Degree |
| Option D: | 5 Degree |
|  |  |
| 16. | A rocket engine for the combustion of its fuel |
| Option A: | carries its own oxygen |
| Option B: | uses surrounding air |
| Option C: | uses compressed atmospheric air |
| Option D: | does not require oxygen |
|  |  |
| 17. | Enthalpy of formation is defined as enthalpy of compound at |
| Option A: | 250C and 10 atmospheres |
| Option B: | 250C and 1 atmosphere |
| Option C: | 00C and 1 atmosphere |
| Option D: | 1000C and 1 atmosphere |
|  |  |
| 18. | Reciprocating pumps are most suited where |
| Option A: | Constant head are required on mains despite fluctuation in discharge |
| Option B: | Operating speeds are much high |
| Option C: | Constant supplies are required regardless of pressure fluctuation |
| Option D: | Operating speeds are much low |
|  |  |
| 19. | In order to avoid cavitation in centrifugal pump |
| Option A: | The suction pressure should be high |
| Option B: | The delivery pressure should be high |
| Option C: | The suction pressure should be low |
| Option D: | The delivery pressure should be low |
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| 20. | The \_\_\_\_\_\_\_\_\_\_\_\_ rate is the result of a purely chemical combination process in which the flame eats it way into the unburned charge. |
| Option A: | Transposition |
| Option B: | Reaction |
| Option C: | Burning |
| Option D: | Fusion |
|  |  |
| 21. | What is the heat of reaction if the heat of combustion of products is 40 J and heat of combustion of reactants is 25 J? |
| Option A: | 65 J |
| Option B: | 1.6 J |
| Option C: | 15 J |
| Option D: | -15 J |
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| 22. | The equivalent evaporation (kg/hr) of a boiler producing 2000 kg/hr of steam with enthalpy content of 2426 kJ/kg from feed water at temperature 40°C (liquid enthalpy = 168 kJ/kg, enthalpy of vaporization of water at 100°C = 2258 kJ/kg) is |
| Option A: | 2000 |
| Option B: | 2149 |
| Option C: | 1682 |
| Option D: | 1649 |
|  |  |
| 23. | Presence of \_\_\_\_\_\_\_\_\_\_ in a dry gaseous fuel does not contribute to its calorific value. |
| Option A: | Sulphur |
| Option B: | Oxygen |
| Option C: | Hydrogen |
| Option D: | Carbon |
|  |  |
| 24. | When the total heat of steam is h kJ/kg and the sensible heat of feed water is hf1 kJ/kg, then the factor of evaporation is given by |
| Option A: | (h - hf1)/2257 |
| Option B: | (h + hf1)/2257 |
| Option C: | (h × hf1)/2257 |
| Option D: | (h / hf1)/2257 |
|  |  |
| 25. | The degree of reaction is defined as the ratio of |
| Option A: | Enthalpy drop in the fixed blades to the total enthalpy drop in the fixed and moving blades |
| Option B: | Enthalpy drop in the moving blades to the enthalpy drop in the fixed blades |
| Option C: | Enthalpy drop in the moving blades to the total enthalpy drop in the fixed and moving blades |
| Option D: | Enthalpy drop in the fixed blades to the enthalpy drop in the moving blades. |
|  |  |
| 26. | Which statement is incorrect about reaction turbine |
| Option A: | both Kinetic and Pressure energy converted to work |
| Option B: | curved blades are used |
| Option C: | Only pressure energy converted to work |
| Option D: | Nozzle is not required for this turbine |
|  |  |
| 27. | Open cycle gas turbine works on |
| Option A: | Brayton cycle |
| Option B: | Rankine cycle |
| Option C: | Carnot cycle |
| Option D: | Ericsson cycle |
|  |  |
| 28. | The ratio of heat actually released by 1kg of fuel to heat that would be released by complete perfect combustion, is called |
| Option A: | Thermal efficiency |
| Option B: | Combustion efficiency |
| Option C: | Engine efficiency |
| Option D: | Compression efficiency |
|  |  |
| 29. | In a two stage gas turbine plant, with intercooling and reheating........ |
| Option A: | Both work ratio and thermal efficiency improve |
| Option B: | Work ratio improves but thermal efficiency decreases |
| Option C: | Thermal efficiency improves but work ratio decreases |
| Option D: | Both work ratio and thermal efficiency decreases |
|  |  |
| 30. | The relation between maximum pressure ratio and optimum pressure ratio is given by |
| Option A: | optimum pressure ratio = (maximum pressure ratio)/2 |
| Option B: | optimum pressure ratio = maximum pressure ratio |
| Option C: | optimum pressure ratio = sqrt(maximum pressure ratio) |
| Option D: | optimum pressure ratio = (maximum pressure ratio)^2 |
|  |  |
| 31. | The \_\_\_\_ the pressure ratio, the \_\_\_\_ will be efficiency. |
| Option A: | Less, More |
| Option B: | Less, Less |
| Option C: | More, More |
| Option D: | More, Less |
|  |  |
| 32. | The heat of combustion of a fuel |
| Option A: | Is always negative. |
| Option B: | Is equal to the heat of formation. |
| Option C: | Can't be known without calculating it. |
| Option D: | Is always positive. |
|  |  |
| 33. | Specific speed of a turbine depends upon |
| Option A: | Discharge and power |
| Option B: | Discharge and Speed |
| Option C: | Speed, power and head |
| Option D: | Power and head |
|  |  |
| 34. | For radial discharge, the hydraulic efficiency of Francis is given by |
| Option A: | Vw1\*u1 |
| Option B: | Vw1\*u1+ Vw2 u2/ gH |
| Option C: | Vw1\*u1/ gH |
| Option D: | gH/ Vw1\*u1 |
|  |  |
| 35. | The speed ratio of Francis turbine is the ratio of |
| Option A: | Theoretical jet velocity to peripheral speed at inlet |
| Option B: | Peripheral speed at inlet to the theoretical jet velocity |
| Option C: | Velocity of flow at inlet to theoretical jet velocity |
| Option D: | theoretical jet velocity to velocity of flow at inlet |
|  |  |
| 36. | Which of the following turbine is suitable for specific speed ranging from 300 to 1000 |
| Option A: | Kaplan turbine |
| Option B: | Pelton turbine |
| Option C: | Francis turbine |
| Option D: | Propeller turbine |
|  |  |
| 37. | The width of the bucket for a pelton wheel is generally …………… the diameter of jet |
| Option A: | Double |
| Option B: | Three times |
| Option C: | Four times |
| Option D: | Five times |
|  |  |
| 38. | From indicator diagram of reciprocating pump it is observed that maximum friction head occurs at an angle of |
| Option A: | 0 degree |
| Option B: | 45 degree |
| Option C: | 90 degree |
| Option D: | 60 degree |
|  |  |
| 39. | Fuel gases containing hydrocarbons (e.g. coke oven gas) are not preheated before burning, mainly because |
| Option A: | the hydrocarbons crack thereby choking and fouling the heat transfer surface by carbon soot. |
| Option B: | it reduces its calorific value tremendously. |
| Option C: | it reduces its flame temperature tremendously. |
| Option D: | there are chances of explosion during preheating. |
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| 40. | Which one of the following is the fire-tube boiler? |
| Option A: | Babcock and Wilcox boiler |
| Option B: | Locomotive boiler |
| Option C: | Stirling boiler |
| Option D: | Benson boiler |
|  |  |
| 41. | Given, Vb = Blade speed, V = Absolute velocity of steam entering the blade, α = Nozzle angle. The efficiency of an impulse turbine is maximum when |
| Option A: | Vb = 0.5V cos α |
| Option B: | Vb= V cos α |
| Option C: | Vb = 0.5V2 cos α |
| Option D: | Vb = V2 cos α |
|  |  |
| 42. | The equivalent evaporation (kg/hr) of a boiler producing 2000 kg/hr of steam with enthalpy content of 2426 kJ/kg from feed water at temperature 40°C (liquid enthalpy = 168 kJ/kg, enthalpy of aporisation of water at 100°C = 2258 kJ/kg) is |
| Option A: | 2000 |
| Option B: | 2149 |
| Option C: | 1682 |
| Option D: | 1649 |
|  |  |
| 43. | The output of a gas turbine is 300 KW and its efficiency is 20 percent, the heat supplied is |
| Option A: | 1500 KW |
| Option B: | 6000 KW |
| Option C: | 600 KW |
| Option D: | 150 KW |
|  |  |
| 44. | The gas turbines are mainly used in? |
| Option A: | Locomotives. |
| Option B: | Aircrafts. |
| Option C: | Automobiles. |
| Option D: | Pumping stations |
|  |  |
| 45. | Which one of the following is the correct sequence of the position of the given components in a turbo-prop ? |
| Option A: | Propeller, Compressor, Turbine, Burner |
| Option B: | Compressor, Propeller, Burner, Turbine |
| Option C: | Propeller, Compressor, Burner, Turbine |
| Option D: | Compressor, Propeller, Turbine, Burner |
|  |  |
| 46. | single acting reciprocating pump gives \_\_\_\_\_ discharge while the double acting reciprocating pump gives \_\_\_\_\_\_ discharge. |
| Option A: | intermittent, uniform |
| Option B: | uniform, intermittent |
| Option C: | uniform, uniform |
| Option D: | intermittent, intermittent |
|  |  |
| 47. | For which of these applications is the turboshaft engine most suited? |
| Option A: | Low-speed fixed-wing aircraft |
| Option B: | Helicopters |
| Option C: | High altitude reconnaissance aircraft |
| Option D: | High-speed combat aircraft |
|  |  |
| 48. | Find the diameter of jet D for pelton turbine, if jet ratio m and diameter of jet d are given as 10mm and 125mm. |
| Option A: | 1.25 meters |
| Option B: | 1.5 meters |
| Option C: | 2 meters |
| Option D: | 1.2 meters |
|  |  |
| 49. | A reaction turbine works at 450 rpm and it's diameter at inlet is 1.2 m. it's approximate tangential velocity at inlet in m/sec. |
| Option A: | 28.27 |
| Option B: | 14.14 |
| Option C: | 56.54 |
| Option D: | 12.12 |
|  |  |
| 50. | The flow ratio of a Kaplan turbine is given as 0.7. The available head is 30 m. The outer diameter of the runner is 3.5 m and the hub diameter is 2 m. the approximate Quantity of water flowing through the turbine per second (m3/s) is |
| Option A: | 130 |
| Option B: | 110 |
| Option C: | 90 |
| Option D: | 70 |
|  |  |
| 51. | Specific speed of a turbine depends upon |
| Option A: | Discharge and power |
| Option B: | Discharge and Speed |
| Option C: | Speed, power and head |
| Option D: | Power and head |
|  |  |
| 52. | Centrifugal pumps are used to transport \_\_\_\_\_\_\_\_ |
| Option A: | Pressure |
| Option B: | Speed |
| Option C: | Power |
| Option D: | Fluid |
|  |  |
| 53. | What is the shape of the diffuser in the centrifugal pump? |
| Option A: | Round |
| Option B: | Dough nut |
| Option C: | Rectangle |
| Option D: | Cylindrical |
|  |  |
| 54. | If actual discharge is 13.99 lit/s and theoretical discharge is 14.73 lit/s then coefficient of discharge is |
| Option A: | 0.95 |
| Option B: | 9.5 |
| Option C: | 0.095 |
| Option D: | 1.05 |
|  |  |
| 55. | The vertical distance between the top surface level of sump and the center of impeller is known as |
| Option A: | Gross head |
| Option B: | delivery lift |
| Option C: | Friction head |
| Option D: | suction lift |
|  |  |
| 56. | During combustion of gaseous fuels, deficiency of air |
| Option A: | lengthens the flame. |
| Option B: | tends to shorten the flame. |
| Option C: | does not affect the flame length. |
| Option D: | increases the flame temperature. |
|  |  |
| 57. | In velocity compounding, steam is passed through |
| Option A: | fixed nozzle-moving blades-fixed blades-moving blades |
| Option B: | fixed nozzle-moving blades-fixed nozzles-moving blades |
| Option C: | moving blades-fixed nozzles- fixed blades-moving blades |
| Option D: | fixed blades-moving blades-fixed nozzles- moving blades |
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| 58. | In impulse turbines, when friction is neglected, the relative velocity of steam at outlet tip of the blade is \_\_\_\_\_\_\_\_\_ the relative velocity of steam at inlet tip of the blade. |
| Option A: | Equal to |
| Option B: | Less than |
| Option C: | Greater than |
| Option D: | Less than and equal to |
|  |  |
| 59. | Adiabatic flame temperature of fuel is depended on initial temperature of |
| Option A: | Fuel |
| Option B: | Air |
| Option C: | fuel and air |
| Option D: | does not depend on any of the factors mentioned |
|  |  |
| 60. | When the fuel is burned and water is released in the liquid phase, the heating value of fuel is called |
| Option A: | higher heating value |
| Option B: | lower heating value |
| Option C: | enthalpy of formation |
| Option D: | enthalpy of combustion |
|  |  |
| 61. | High pressure boiler is the one in which pressure of steam generated is |
| Option A: | greater than 70 bar |
| Option B: | greater than 20 bar |
| Option C: | greater than 80 bar |
| Option D: | greater than 40 but less than 80 bar |
|  |  |
| 62. | Cochran boiler is |
| Option A: | horizontal and externally fired boiler |
| Option B: | horizontal and internally fired boiler |
| Option C: | vertical and internally fired boiler |
| Option D: | vertical and water tube boiler |
|  |  |
| 63. | In case of impulse steam turbine |
| Option A: | there is enthalpy drop in fixed and moving blades |
| Option B: | there is enthalpy drop only in moving blade |
| Option C: | no change in enthalpy |
| Option D: | there is enthalpy drop in nozzles |
|  |  |
| 64. | In case of reaction steam turbine |
| Option A: | there is enthalpy drop in fixed and moving blades |
| Option B: | there is enthalpy drop only in moving blade |
| Option C: | there is enthalpy drop in nozzles |
| Option D: | no change in enthalpy |
|  |  |
| 65. | A close gas turbine plant work on |
| Option A: | Brayton Cycle |
| Option B: | Rankine cycle |
| Option C: | Reverse Brayton Cycle |
| Option D: | Reverse Rankine cycle |
|  |  |
| 66. | Ideally the expansion in gas turbine is assume to be |
| Option A: | Isentropic |
| Option B: | Isothermal |
| Option C: | Isochoric |
| Option D: | Isobaric |
|  |  |
| 67. | Compare to steam turbine the weight of the gas turbine per kW Power is |
| Option A: | Less |
| Option B: | More |
| Option C: | it can be more or less |
| Option D: | Same |
|  |  |
| 68. | In case of reciprocation pump the acceleration head at the beginning of the suction head is |
| Option A: | Zero |
| Option B: | Minimum |
| Option C: | Maximum |
| Option D: | Negative |
|  |  |
| 69. | In double acting reciprocation pump total volume flow rate compare to single acting reciprocating pump having same cylinder dimensions is |
| Option A: | 2 time the volume flow rate of single acting reciprocating pump |
| Option B: | less than the volume flow rate of single acting reciprocating pump |
| Option C: | less than 2 time the volume flow rate of single acting reciprocating pump |
| Option D: | more than 2 time the volume flow rate of single acting reciprocating pump |
|  |  |
| 70. | Acceleration head is responsible for |
| Option A: | Increase in power consumed by the pump |
| Option B: | Decrease in power consumed by the pump |
| Option C: | Some time Decreases and sometimes increases power consumed by the pump |
| Option D: | Does not affect on the power Consumed |
|  |  |
| 71. | In case of centrifugal pump( running at constant speed ) with the increase in discharge |
| Option A: | Pressure head increases |
| Option B: | Pressure head decreases |
| Option C: | Pressure head remain constant |
| Option D: | Pressure head first decreases and then increases |
|  |  |
| 72. | In case of centrifugal pump if the vane tips are radial at the outlet then |
| Option A: | Relative velocity is equal to flow velocity at the exit |
| Option B: | Relative velocity is less than flow velocity at the exit |
| Option C: | Relative velocity is more than flow velocity at the exit |
| Option D: | Cannot predict |
|  |  |
| 73. | Inc case of reaction turbine energy of water entering the reaction turbine is \_\_ |
| Option A: | fully the kinetic energy |
| Option B: | fully the pressure energy |
| Option C: | partly the pressure energy and partly the kinetic energy |
| Option D: | Unpredictable |
|  |  |
| 74. | Which of the following is an example of impulse turbine? |
| Option A: | Propeller turbine |
| Option B: | Francis turbine |
| Option C: | Kaplan turbine |
| Option D: | Pelton wheel |
|  |  |
| 75. | Power required to drive a centrifugal pump is directly proportional to \_\_\_\_\_\_\_\_\_\_ of its impeller. |
| Option A: | cube of diameter |
| Option B: | fourth power of diameter |
| Option C: | Diameter |
| Option D: | square of diameter |
|  |  |
| 76. | In the velocity triangle of the turbine the whirl component indicates |
| Option A: | Kinetic energy of the fluid |
| Option B: | Velocity of the rotor |
| Option C: | Mass flow rate of the fluid |
| Option D: | Total energy of the fluid |
|  |  |
| 77. | Momentum is define as the product of |
| Option A: | Mass and velocity of the body |
| Option B: | Mass and acceleration of the body |
| Option C: | Mass of the body and force acting on it |
| Option D: | Velocity of a body and force acting on it |
|  |  |
| 78. | The force exerted by a jet of water on a fixed semicircular plate in the direction of the jet when the jet strikes at the centre of the plate is |
| Option A: | Equal to the force exerted by the jet on the fixed vertical plate |
| Option B: | Half of the force exerted by the jet on the fixed vertical plate |
| Option C: | Two times the force exerted by the jet on the fixed vertical plate |
| Option D: | Square of force exerted by the jet on the fixed vertical plate |
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**Descriptive SAMPLE SET**

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| Q1. | Derive the equation for efficiency of Brayton cycle for gas turbine. State it’s assumptions. |
| Q2. | Derive the equation for efficiency of Actual gas turbine cycle. |
| Q3. | The air enters the compressor of an open cycle constant pressure gas turbine at a pressure of 1 bar & temperature 20°C.The pressure of the air after compression is 4 bar. The isentropic efficiencies of compression and turbine are 80% & 85% respectively .Air fuel ratio=90:1 Flow rate of air:3Kg/sec Find:1.Power Developed. 2.Thermal Efficiency (Cp=1 ,γ=1.4,C.V=41800KJ/Kg) |
| Q4. | In an air standard gas turbine ,The air at ambient temperature of15°C and atm. pressure enters the compressor ,where it is compressed up to 5 times atm. pressure .Turbine inlet temperature is 800°C.and expansion occurs up to atmospheric pressure .Determine the ratio of turbine work to compressor  New Doc 2020-02-07 12.53.17_3.jpg  work.(Cp=1.005KJ/KgK,,γ=1.4) |
| Q5. | Differentiate between Water tube and Fire tube Boilers. |
| Q6. | Write note on Boiler Mountings and Accessories. |
| Q7. | Make a list of any five boiler mountings and write down their functions. |
| Q8. | What is enthalpy of formation (ΔHf)=? |
| Q9. | Explain the construction and operation of solid propellent rocket engine. |
| Q10. | Write classification of jet propulsion engine with example. |
| Q11. | What is cavitation and what are it causes? How will you prevent the cavitation in hydraulic machine? |
| Q12. | Explain with a neat sketch multistage centrifugal pump for high discharge. |
| Q13. | Explain the term “Equivalent Evaporation” |
| Q14. | List the merits and demerits of closed cycle gas turbine over open cycle gas turbine. |
| Q15. | What do you understand by governing of hydraulic turbines? |
| Q16. | Write a note on Rocket Engine |
| Q17. | What are the general features of rotary pumps? List the merits and demerits of rotary pumps oven positive displacement pumps. |
| Q18. | Give the comparison between Impulse Turbine and Reaction Turbine |
| Q19. | Write a short note on classification of water turbine |
| Q20. | Explain the working of Ramjet Engine? |
| Q21. | Describe working of reheating gas turbine plant with the help  of a T-S diagram. |
| Q22. | A Pelton wheel is to be designed for the following specifications:  Power (Brake or Shaft) = 9560 kW; Head = 350 m; Speed = 750 rpm;  Overall efficiency = 85%; Jet diameter is limited to 1/6th of the wheel  diameter. Determine the wheel diameter, diameter of jet and number of jet  required. Take Cv = 0.985 and speed ratio =0.45. |
| Q23. | In a De-Laval turbine, steam issues from the nozzle with a velocity of  850m/s. The nozzle angle is 200. Mean blade velocity is 350 m/s and the  blades are equiangular. The mass flow rate is 1000 kg/min. The friction  factor is 0.8. Determine blade angles, axial trust on the bearings, power  developed in kW, blade efficiency, stage efficiency if nozzle efficiency is  93%. |
| Q24 | Differentiate between Turbojet and Turboprop Engine. |
| Q25. | Differentiate between Jet propulsion and Rocket Propulsion. |
| Q26. | Write short note on High Pressure Boilers. |
| Q27. | Write note on :1.Velox Boiler 2.Benson Boiler |
| Q28. | 3000Kg of dry saturated steam is generated per hour in a Lancashire boiler at a pressure of 10 bar from feed water at a temperature of 20°C The grate area is 3m2and 100 Kg of coal is burnt per m2. of grate area per hour. If the calorific value of coal is 34000Kj/kg.Determine:1. Equivalent evaporation from and at 100°C per Kg of coal/hour 2. Boiler Efficiency. |
| Q29. | Following data related to a trial on boiler using economizer, air pre heater and superheater: condition of steam at exit of boiler = 20 bar, 0.96 dry Temperature of steam at exit of super heater= 300oC. steam evaporation rate/ kg of fuel = 12 kg. Room temp t0 = 250C. Temperature of feed water at exit of economizer t1 = 500C. Temperature of air at exit of air preheater, ta = 700C. Temperature of flue gases at inlet to super heater, economizer, air preheater and exit of air preheater are resp 6500C, 4300C, 3000C and 1800C. Assume that air supplied is 19 kg/ kg of fuel of calorific value of 45000 KJ/kg, find   1. Equivalent evaporation with and without economizer, from and at 1000C 2. Thermal efficiency of the boiler with and without economizer 3. Thermal efficiency of super heater, economizer and air preheater.   Draw up heat balance sheet. Assume specific heat of flue gases and air as 1.05 and 1.01KJ/kg K |
| Q30. | The air enters the compressor of an open cycle constant pressure gas turbine at a pressure of 1.01bar and temperature 150C. The pressure of the air after compression is four times the initial pressure with an isentropic efficiency of 82%. The air is then passing through a heat exchanger heated by the turbine exhaust before reaching the combustion chamber. In the heat exchanger 78% of the available heat is given to the air. The maximum temperature after the constant pressure combustion is 6000C and efficiency of the turbine is 70%. Neglecting other losses to find I) net work ii) cycle efficiency |
| Q31. | Derive the expression for the condition for maximum blade efficiency in Parsons reaction turbine. |
| Q32. | 1. Define the term: suction head, delivery head, static head and manometric head. 2. What is priming of a centrifugal pump? Explain clearly why priming is essential before starting a centrifugal pump? |
| Q33. | A reaction turbine works at 450 rpm under a head of 120 m. The diameter of the inlet is 1.2 m and the flow area in 0.4m2. At the inlet, absolute and the relative velocities make an angle of 20o and 60o respectively with the tangential velocity. Determine the power developed and the hydraulic efficiency. Assume the velocity of whirl at the outlet to be zero. |
| Q34. | The length and diameter of a suction pipe of a single acting reciprocating pump are 5 m and 10 cm respectively. The pump has a plunger of diameter 150 mm and of stroke length of 300 mm. The center of the pump is 4 m above water surface in the pump. The atmospheric pressure head is 10.3 m of water and pump is running at 40 rpm. Determine (i) Pressure head due to acceleration at the beginning of the suction stroke (ii) Maximum pressure head due to acceleration (iii) Pressure head in the cylinder at the beginning and at the end of the stroke. |
| Q35. | What are different air fuel ratio considered in combustion process |
| Q36. | Explain Classification of pump in detail |
| Q37. | Write the features of High Pressure boiler in comparison to  low pressure boiler. |
| Q38. | Derive an expression for maximum hydraulic efficiency of a Pelton wheel  with neat sketch. State assumptions clearly |
| Q39. | An inward flow reaction turbine is supplied 0.233 m3/s of water under a  head of 11 m. The wheel vanes are radial at inlet and the inlet diameter is  twice the outlet diameter. The velocity of flow is constant and equal to 1.83  m/s. The wheel makes 370 r.p.m. Determine guide vane angle, inlet and  outlet diameter of wheel and width of wheel at inlet and exit. Assume that  the discharge is radial and there are no losses in wheel. Take speed ratio =  0.7. Neglect the thickness of the vane. |
| Q40. | The diameter & stroke of a single acting reciprocating pump are 300mm & 500mm resp. The pump takes it supply of water from sump 3.2 m below the pump axis through pipe 9 m long & 200mm dia. If separation occurs at 2.4m of water absolute. Determine; i) The speed at which separation may take place at the beginning of suction stroke. ii) The speed of the pump if an air vessel is fitted on suction side 2.4 m above the sump. Take hatm = 10.3 m of water and friction co-efficient = 0.01 |
| Q41. | Obtain an expression for the work done per second by water on the runner of a Pelton wheel. Hence derive an expression for maximum efficiency of the Pelton wheel |
| Q42. | A Francis turbine has a dia of 1.4 and rotates at 430 rpm. Water enters the runner without shock with a flow velocity of 9.5m/s and leaves the runner without whirl with an absolute velocity of 7 m/s. The difference between the sum of static and potential heads at entrance to the runner and at the exit from the runner is 62m. The turbine develops 12.25MW. The flow rate through the turbine is 12m3/s for a net head of 115m. Find the following:  i) The absolute velocity of water at entry to the runner and the angle of the  inlet guide Vanes.  ii) The entry angle of the runner blades  iii) The loss of head in the runner |
| Q43. | A single acing reciprocating pump has stroke length of 15 cm. the suction pipe is  7 m long and the ratio of suction pipe diameter to the plunger diameter is ¾. The water level in the sump is 2.5 m below the axis of the pump. Cylinder and pipe connecting the sump and pump cylinder is 7.5 cm in the diameter. Take f=0.01. If the crank running at 75 rpm then determine the pressure head on the piston   1. At the beginning of the suction stroke 2. In the middle of suction stroke |
| Q44. | Liquid propane (C3H8) enters a combustion chamber at 25 °C at a rate of 0.05 kg/min where it is mixed and burned with theoretical air that enters the combustion chamber at 7 °C. an analysis of combustion gases reveals that all the hydrogen in the fuel burns to H2O but only but only 90% of carbon burn to CO2 with the remaining 10% forming Co if the exit temperature of combustion gases is 1500 K (a) the mass flow rate of air and (b) the rate of heat transfer from the combustion chamber |
| Q45. | Describe about **Essentials of good boiler.** Explain the construction and working of Cochran boiler |
| Q46. | A Lancashire boiler generates 2400 kg of dry steam per hour at a pressure of 11 bar. The grate area is 3 m2 and 90 kg of coal is burnt per m2 of grate area per hour. The calorific value of the coal is 33180 kJ/kg and the temperature of feed water is 17.5 °C.  Determine  Actual evaporation per kg of coal  Equivalent evaporation from and at 100 °C  Efficiency of the boiler |
| Q47. | Consider a gas turbine working on Brayton cycle. The air enters the compressor at 0.15 MPa and 20 °C. The maximum pressure and temperature of the cycle are 1.2 MPa and 1200 °C respectively. Calculate pressure and temperature at each point in the cycle and cycle efficiency and turbine work for following two cases.  i) Theoretical Brayton cycle  ii) Actual Brayton cycle with turbine and compressor efficiencies of 0.85 each  Also write and explain the significance of compression of fluid in multistage (Draw suitable diagram). |
| Q48. | Describe construction and working of Pelton Wheel. Describe velocity triangle at the tip of the blade. |