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| **Scheme of Valuation/Answer Key**  (Scheme of evaluation (marks in brackets) and answers of problems/key) | | | | | |
| **APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  FOURTH SEMESTER B. TECH DEGREE EXAMINATION, APRIL 2019 | | | | | |
| **Course Code: ME206** | | | | | |
| **Course Name: FLUID MACHINERY (ME)** | | | | | |
| Max. Marks: 100 | | |  | Duration: 3 Hours | |
| **PART A** | | | | | |
|  | | | | | |
|  |  | ***Answer any three questions, each carries 10 marks*** | | | Marks |
| 1 | a) | Figure  Derivation  (Full credits can be given to the derivation of expression only. No need to prove the maximum efficiency value) | | | 1  3 |
|  | b) | (i) Fig  Derivation  (ii) A = 0.004417 m²  F = ρAV² = 1766.8N | | | 1  2  1  2 |
| 2 | a) | (i) Velocity of jet = 33.62m/s  (ii) u = , Diameter of wheel, D = 1.44m  (iii) discharge Q = 0.1912 m³/s  (iv) Diameter of the jet (d) = 85mm  (v) size of buckets  Width, 5d = 425mm  Depth of buckets, 1.2d = 102mm  (iv) Number of buckets on the wheel, Z = 15+ = 23.5say = 24 | | | (1)  (1)  (1)  (1)  (1)  (1) |
|  | b) | 1. Gross head 2. Net head 3. Hydraulic efficiency 4. Mechanical efficiency | | | (1)  (1)  (1)  (1) |
| 3 | a) | (i) governing  (ii) fig  (iii) explanation | | | (1)  (1)  (3) |
|  | b) | Function  Figure  Draft tube theory | | | (1)  (1)  (3) |
| 4 | a) | 1. Power generated   = =  ×   1. Specific speed of the Turbine, = =**159.46 r.p.m**   As specific speed lies between **51** and **255**, the turbine is a **Francis Turbine** | | | (2)  (2)  (1)  (1) |
|  | b) | Type number explanation  Definition of specific speed  Derivation to get result = = | | | (1)  (1)  (2) |
| **PART B** | | | | | |
| ***Answer any three questions, each carries 10 marks*** | | | | | |
| 5 | a) | Minimum starting speed N = 891.8 rpm ( When value of head is taken as 30 m)  Minimum Starting speed = 89.18 rpm (when the head is taken as 30 cm as given in the question). For both the cases full credits can be given. | | | (4) |
|  | b) | Main characteristic curves with figure  Operating characteristics with fig  Constant efficiency curves with figure | | | (2)  (2)  (2) |
| 6 | a) | 1. Suction head 2. Delivery head 3. Static head 4. Manometric head. | | | (1)  (1)  (1)  (1) |
|  | b) | (i) figure  explanation  (ii)Priming & necessity of priming | | | (1)  (2)  (3) |
| 7 | a) | (i) ideal indicator diagram with fig  (ii) derivation of W.D proportional to indicator diagram | | | (2)  (4) |
|  | b) | Area, A = 0.31416m²  The theoretical discharge of the pump, = 0.01047m³/s   1. Co – efficient of discharge, = = 0.955 2. Slip = 0.00047m³/s   Percentage slip of the pump. =4.489 % | | | (1)  (1)  (1)  (1) |
| 8 | a) | Clear derivation with final result, 39.2% | | | (4) |
|  | b) | `(i) figure  Explanation   1. figure 2. explanation | | | (1)  (2)  (1)  (2) |
| **PART C** | | | | | |
| ***Answer any four questions, each carries 10 marks*** | | | | | |
| 9 | a) | = MR  A = 0.0314m²  =A x L = 0.00942m³  M = 0.01094 Kg/cycle  = -1] Jules / cycle =2513.96 J/Cycle  Mass of air compressed / minute = x =10474.83W =**10.47483 KW**  **Power required =**  = **13kw** | | | (1)  (1)  (1)  (1)  (1) |
|  | b) | The final expression given in the question is W= -1] and it is wrong. The correct equation is W= ((rp) (n-1)/n - 1). Full credits can be given for the complete correct steps even though final expression is wrong. | | | (5) |
| 10 | a) | = MR =168182 Kg/cycle  = -1] Jules / cycle =413101.23 J/Cycle  x = 6885 W,  =6.885KW | | | (1)  (2)  (2) |
|  | b) | Clear derivation with final result = | | | (5) |
| 11 | a) | Classification minimum four | | | (4) |
|  | b) | Figure  explanation | | | (2)  (4) |
| 12 | a) | Figure  explanation | | | (2)  (3) |
|  | b) | Five methods (5\*1) | | | (5) |
| 13 | a) | The temperature rise = 213.68ºC | | | (3)  (3) |
|  | b) | Clear derivation with final result,  Inlet , Out let | | | (4) |
| 14 | a) | Figure  explanation | | | (2)  (2) |
|  | b) | Merits (at least 3)  Demerits (at least3) | | | (3)  (3) |
| \*\*\*\* | | | | | |