Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-I Remedial examination March 2009

Subject code:110006

Subject Name: Elements of Mechanical Engg.

Date: 16/03/2009 **Time: 10:30am-1:00pm**

Instructions:

Total Marks: 70

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw a Neat Figure where ever necessary.**

Q.1 **14**

(a) WRITE ABOUT COMBINED GAS LAW, GAS CONSTANT AND NON FLOW PROCESS

(b) PROVE THAT RELATION BETWEEN C_P AND C_V IS $C_P - C_V = R$

(c) AN AIR RECEIVER OF VOLUME 5.5 m^3 CONTAINS AIR AT 10 bar AND 42^0C . A VALVE IS OPENED AND SOME AIR IS ALLOWED TO BLOW OUT TO ATMOSPHERE. THE PRESSURE OF AIR IN THE RECEIVER DROPS TO 12 bar WHEN THE VALVE IS CLOSED.CALCULATE THE MASS OF AIR WHICH HAS LEFT THE RECEIVER.

Q.2

(a) EXPLAIN PRIMING AND PRIMING METHODS **07**

(b) WRITE ABOUT VAPOUR COMPRESSION REFRIGERATING SYSMTEM **07**

OR

(b) DRAWING A FIGURE , EXPLAIN HARTNELL GOVERNOR. **07**

Q.3 **14**

(a) WHAT ARE THE SOURCES OF ENERGY ?

(b) WRITE ABOUT ENGINEERING MATERIALS.

(c) EXPLAIN ABOUT DIFFERENT TYPES OF FULES.

OR

Q.3 **14**

(a) DEFINE

- (i) ENTHALPY
- (ii) SPECIFIC VOLUME OF STEAM.
- (iii) DRYNESS FRACTION OF STEAM
- (iv) INTERMNAL ENERGY

(b) DRAWING A DIAGRAME EXPLAIN CONSTRUCTION AND WORKING OF COMBINED CALORIMETER

(c) DETERMINE THE MASS OF 0.15m^3 OF WET STEAM AT A PRESSURE OF 4 bar AND DRYNESS FRACTION 0.8. ALSO CALCULATE THE HEAT OF 1 m^3 OF STEAM.

Q.4 **14**

(a) EXPLAIN ABOUT BRAKES, CLUTCHES AND COUPLINGS.

(b) WRITE IN DETAIL ABOUT TRANSMISSION OF MOTION AND POWER.

OR

Q. 4 **14**

(a) DRAWING A NEAT AND CLEAN DIAGRAMME OF BABCOCK AND WILCOX BOILER EXPLAIN ITS CONSTRUCITON AND WORKING

(b) DERIVE EFFICIENCY EQUATION FOR DIESEL CYCLE.

Q.5 **14**

(a) WHAT ARE THE USES OF COMPRESSED AIR?

(b) WRITE ONLY THE STATEMENT OF (i) ZEROTH LAW (ii) FIRST AND SECOND LAW OF THERMODYNAMICS.

(c) A SINGLE STAGE RECIPROCATING COMPRESSOR TAKES 1 m^3 OF AIR PERMISSIBLE AT 1.013 bar AND 15^0C AND DELIVERS IT AT 7 bar . ASSUMING THAT THE LAW OF COMPRESSION IS $PV^{1.35}$ = CONSTANT , AND THE CLEARANCE IS NEGLIBLE,
CALCULATE THE INDICATED POWER

OR

Q.5 **14**

(a) WRITE THE DIFFERENCE BETWEEN TWO- STROKE AND FOUR- STROKE CYCLE.

(b) FOLLOWING OBSERVATONS WERE RECORDED DURING A TEST ON A SINGLE CYLINDER OIL ENGINE.

BORE = 300mm
STROKE = 450mm
SPEED = 300r.p.m.
i.m.e.p. = 6 bar
NET BREAK LOAD = 1.5 K.N.
BRAKE DRUM DIAMETER = 1.8 m
BRAKE ROPE DIAMETER = 2 cm.

CALCULATE

(i) INDICATED POWER
(ii) BRAKE POWER
(iii) MECHANICAL EFFICIENCY.

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