

Total No. of Printed Pages:2

SUBJECT CODE NO: E-17
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Automobile Engineering
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- Solve any three questions from each section
 - Draw neat sketches wherever necessary.
 - Assume suitable data, if required.

Section A

- | | | |
|-----|--|----|
| Q.1 | a) How do you classify automobiles? Explain in details giving examples. | 07 |
| | b) Explain the four wheel drive arrangement with neat sketch. | 06 |
| Q.2 | a) What is the difference between the centrifugal and semi centrifugal clutches | 07 |
| | b) Explain the working of a single plate clutch with the help of a simple diagram. | 06 |
| Q.3 | a) Describe the construction of a sliding mesh gear box. Show how the power flows in various speeds. | 07 |
| | b) Explain the construction and working of differential with a neat sketch. | 06 |
| Q.4 | a) Differentiate clearly between the functions of a spring and a shock absorber. Explain the construction and working of a telescopic type of shock absorber with the help of neat sketch. | 08 |
| | b) What is the function of an anti-roll device in vehicles? Explain clearly how it performs the same in actual practice. | 05 |
| Q.5 | Write short notes on(any two) | 14 |
| | a) Overdrive | |
| | b) Epicyclic gearbox | |
| | c) Air suspension | |
| | d) Macpherson strut type of suspension | |

Section B

- Q.6 a) Explain the terms 07
 i) Camber
 ii) King pin inclination.
 What are the effects of each on the steering characteristics of a vehicle?
- b) What do you understand by backlash in steering gears? Sketch a worm and wheel steering gear and explain its working? 06
- Q.7 a) Discuss with the help of simple sketches, the construction of various types of disc wheels. 07
 b) Sketch front axle of car and show how it is connected with the stub axle. 06
- Q.8 a) Describe briefly a 'tandem master cylinder' used in hydraulic braking system. 07
 b) Explain briefly the working of 'air brakes'. What are their advantages and disadvantages? 06
- Q.9 a) Draw a layout of the air-conditioning system for a car and explain its working. 07
 b) Enumerate the factors which affect battery life. 06
- Q.10 Write short notes on (any two) 14
- a) Tubeless tyre & conventional tube tyre.
 b) Alternator (A.C. Generator).
 c) Disc brakes.
 d) Electronic power steering.

Total No. of Printed Pages:4

SUBJECT CODE NO: E-47
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Project Management and Operations Research
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- N.B
- i) solve any three questions from each section
 - ii) assume suitable data, if required
 - ii) Draw neat sketches, whenever necessary.

Section A

- Q.1
- a) Explain in brief the applications of operations research. 05
 - b) A firm uses lathe, milling and grinding machine to make two machine parts. The table below shows the machining time required for each part, machining time available (per week) on different machines and profit on each machine part. 08
Find the no. of part- I & part-II to be manufactured per week in order to maximize the weekly profit.

| Types of machine | Machine time required for the machined part (min) | | Machining time available per week (min) |
|------------------|---|---------|---|
| | Part-I | Part-II | |
| Lathe | 12 | 6 | 3000 |
| Milling machine | 4 | 10 | 2000 |
| Grinding machine | 2 | 3 | 900 |
| Profit per unit | Rs.40 | Rs.100 | |

- Q.2 Solve by two-phase method maximum, 13
- $$Z = 4x_1 + 5x_2 - 3x_3;$$
- Subjected to, $x_1 + x_2 + x_3 = 10$,
- $$x_1 + x_2 \geq 1,$$
- $$2x_1 + 3x_2 + x_3 \leq 30, \quad x_1, x_2, x_3 \geq 0$$

Q.3 Solve the following LPP by Big M Method.

13

Minimize,

$$Z = 4x_1 + x_2;$$

Subjected to,

$$\begin{aligned} 3x_1 + x_2 &= 3, \\ 4x_1 + 3x_2 &\geq 6, \\ x_1 + 2x_2 &\leq 3, \\ x_1, x_2 &\geq 0 \end{aligned}$$

Q.4 For the following transportation problem, the cell entities represent cost. Find out the optimum solution 14
and min, Transportation cost.

| | 1 | 2 | 3 | 4 |
|---|----|----|----|----|
| A | 10 | 0 | 20 | 11 |
| B | 12 | 7 | 9 | 20 |
| C | 0 | 14 | 16 | 18 |

Q.5 a) Solve the following assignment problems:

07

| | | | | | |
|----|----|----|----|----|----|
| 12 | 10 | 15 | 22 | 18 | 8 |
| 10 | 18 | 25 | 15 | 16 | 12 |
| 11 | 10 | 3 | 8 | 5 | 9 |
| 6 | 14 | 10 | 13 | 13 | 12 |
| 8 | 12 | 11 | 7 | 13 | 10 |

b) A truck owner finds from his past record that the maintenance cost per year of a truck whose purchase price is Rs.8000 are give as :

06

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------------|------|------|------|------|------|------|------|------|
| Maintained coast | 1000 | 1300 | 1700 | 2200 | 2900 | 3800 | 4800 | 6000 |
| Resale price (Rs) | 4000 | 2000 | 1200 | 600 | 500 | 400 | 400 | 400 |

Determine at which time it is profitable to replace the trucks.

SECTION B

- Q.6 a) A supermarket has a single cashier. During the peak hours, customers arrive at rate of 20 customers per hours. The average no. of customers that can be processed by the cashier is 24 per hour. Calculate 07
- The probability that the cashier is idle.
 - Average no. of customers in the queuing system
 - Average time a customer's spends in the system
 - Average no. of customers in the queue.
- b) Explain the following queuing terms : 06
- Traffic intensity
 - Balking
 - Reneging
 - Jockeying

- Q.7 a) Solve the following 3×5 game using dominance property. 07

| | | Player B | | | | |
|----------|---|----------|---|----|----|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Player A | 1 | 2 | 5 | 10 | 7 | 2 |
| | 2 | 3 | 3 | 6 | 6 | 4 |
| | 3 | 4 | 4 | 8 | 12 | 1 |

- b) Find the sequence for the following 8 jobs that will minimise the total elapsed time. Each job is processed in the order C-A-B. The processing time in hour are given below. 07

| Jobs | Machines | | |
|------|----------|----|----|
| | A | B | C |
| 1 | 4 | 8 | 5 |
| 2 | 6 | 10 | 6 |
| 3 | 7 | 7 | 2 |
| 4 | 4 | 8 | 3 |
| 5 | 5 | 11 | 4 |
| 6 | 3 | 8 | 9 |
| 7 | 6 | 9 | 15 |
| 8 | 2 | 13 | 11 |

- Q.8 a) Define inventory. What is the necessity of maintaining the inventory? 06
- b) The annual demand of an item is of 3200 unit. The cost per unit is Rs.6 and the inventory carrying charges are invested as 25% per annum. If the cost of one procurement is Rs.150. Find:- 07
- Economic order quantity.
 - Time between the orders.

- iii. No-of orders per year.
- iv. The optimal cost.

Q.9

The following table shows activities with their three time estimates.

13

- i. Draw the network and find the critical path.
- ii. What is the probability that the project will be completed:-
 - a) At least 4 weeks earlier than the expected time.
 - b) At least 4 weeks later than the expected time.
- iii. b) At least 4 weeks later than the expected time.
- iv. If the project due date is 19 weeks; what is the probability of not meeting the due date.

| Activity | To | Tm | Tp |
|----------|----|----|----|
| 1-2 | 1 | 1 | 7 |
| 1-3 | 1 | 4 | 7 |
| 1-4 | 2 | 2 | 8 |
| 2-5 | 1 | 1 | 1 |
| 3-5 | 2 | 5 | 14 |
| 4-6 | 2 | 5 | 8 |
| 5-6 | 3 | 6 | 15 |

| | | | | |
|-------|-------|-------|-------|-------|
| Z | -1.0 | -1.33 | 1.33 | 0.66 |
| P (%) | 15.87 | 9.18 | 90.82 | 74.54 |

Q.10

The table below shows the normal and crash timing and the corresponding costs. The indirect cost for the project is Rs.300 per day. Draw the project. Find the optimum project duration and total min. Project cost

13

| Activities | Normal | | Crash | |
|------------|-------------|-----------|-------------|-----------|
| | Time (days) | Cost (Rs) | Time (days) | Cost(Rs.) |
| 1-2 | 6 | 1400 | 4 | 1900 |
| 1-3 | 8 | 2000 | 5 | 2800 |
| 2-3 | 4 | 1100 | 2 | 1500 |
| 2-4 | 3 | 800 | 2 | 1400 |
| 3-4 | 0 | 0 | 0 | 0 |
| 2-5 | 6 | 900 | 3 | 1600 |
| 4-6 | 10 | 2500 | 6 | 3500 |
| 5-6 | 3 | 500 | 2 | 1800 |

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Total No. of Printed Pages:3

SUBJECT CODE NO:- E-79
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Refrigeration and Air Conditioning
(REVISED)

[Time: 3:00 Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- 1) Solve three questions from each section.
- 2) Figure to the right indicate full marks.
- 3) Use of refrigerant table, steam tables & psychometric chart is allowed.

Section A

- Q.1 a) Explain simple vapour compression refrigeration system. 06
- b) Explain effect of suction pressure and discharge pressure on simple vapour compression cycle. 07
- Q.2 a) Two refrigerators A and B operate in series. The refrigerator A absorbs energy at the rate of 07
 1KJ/S from a body at temperature 300K and rejects energy as heat to a body at temperature T. The refrigerator B absorbs the same quantity of energy which is rejected by the refrigerator A from the body at temperature T, and rejects energy as heat to a body at temperature 1000K. If both the refrigerators have the same c.o.p calculate,
- i) The temperature T of the body.
 ii) The c.o.p of the refrigerators
 iii) The rate at which energy is rejected as heat to the body at 1000k.
- b) 500kgs of fruits are supplied to a cold storage at 20⁰c. The cold storage is maintained at -5⁰c 06
 and the fruits get cooled to the storage temperature in 10hr. The latent heat of freezing is 105 KJ/ kg & specific heat of fruit is 1.256 kJ/ kg. k . find the refrigeration capacity of the plant.

Q.3 In a 15 TR ammonia plant, compression is carried out in two stages with water & flash intercooling & water subcooling. The particulars of the plant are as follows: 13

Condenser pressure = 12 bar,

Evaporator pressure = 3 bar,

Flash intercooler pressure = 6 bar

Limiting temperature for intercooler and sub-cooling = 20°C.

Draw p-h chart & estimate,

- i) The c.o.p of the plant
- ii) The power required to drive the compressor.
- iii) The swept volume for each compressor if the volumetric efficiency of both the compressor is 80%.

Q.4 An aircraft refrigeration plant has to handle a cabin load of 30 tonnes. The atmospheric temperature is 17°C. The atmospheric air is compressed to a pressure of 0.95 bar & temperature of 30°C due to ram action. This air is then further compressed in a compressor to 4.75 bar, cooled in a heat exchanger to 67°C, expanded in turbine to 1 bar pressure & supplied to the cabin. The air leaves the cabin at a temperature of 27°C. The isentropic efficiencies of both compressor & turbine are 0.9. calculate the mass of air circulated per minute & the c.o.p. 13

For air $c_p = 1.004 \text{ KJ/Kg. K}$

$C_p/c_v = 1.4$

Q.5 Short note on the following (any three) 14

- i) Bell-coleman cycle
- ii) DART
- iii) Cascade refrigeration system
- iv) Two stage compression with water intercooler & liquid sub-cooler.
- v) Two-stage compression with liquid intercooler.

Section :B

Q.6 a) Explain lithium Bromide vapour absorption refrigeration system. 07

b) Practical vapour absorption refrigeration system. 06

- Q.7 a) What is refrigerant? Describe classification of refrigerant. 06
- b) Explain the procedure for designations of refrigerant? With some examples. 07
- Q.8 a) Atmosphere air was found to have a dry bulb temp. of 30°C & a WBT = 18°C . The barometric pressure was observed to be 856 mm of Hg. Using steam table. Determine the relative humidity, the specific humidity, the dew point temp, enthalpy & volume. 07
- b) Explain By-pass factor of Heating coil. 06
- Q.9 A conference room of 60 seating capacity is to be air –conditioned for comfort conditions of 22°C dry bulb temperature & 55% relative humidity. The out door condⁿ are 32°C dry bulb temp. And 22°C wet bulb temperature. The quantity of air supplied is $0.5 \text{ m}^3/\text{min}$ per person. The comfort conditions are achieved first by chemical dehumidification & by cooling coil. 13
- Determine:
- Dry bulb temp. of air at exit of dehumidifier.
 - Capacity of dehumidifier,
 - Capacity & surface temp. of cooling coil, if the by-pass factor is 0.30.
- Q.10 Write short note on the following. (Any three) 14
- Ice plant
 - Stem jet air conditioning system.
 - Human comfort
 - Domestic refrigerator
 - GWP & ODP

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-118
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-II: Industrial Engineering
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- i) Solve any three questions from each section.
 - ii) Figures to the right indicate full marks.
 - iii) Assume suitable data wherever necessary and state it clearly.

Section A

- | | | |
|-----|--|----|
| Q.1 | (a) Define industrial Engineering. How does industrial engineering help to increase the productivity of an organization? | 07 |
| | (b) "Productivity is a means for increasing the welfare of the nation." Justify the statement. | 06 |
| Q.2 | (a) Explain basic work content and excess work content. Mention the tools to reduce the excess work content. | 09 |
| | (b) Write a short note on work study and the management. | 04 |
| Q.3 | (a) Construct a two handed process chart for an operator for assembly of nut and bolt. | 09 |
| | (b) What are therbligs? Give any four therbligs with symbols. | 04 |
| Q.4 | (a) Critical examination is a motive force to develop a new method". Justify. | 07 |
| | (b) State the principles of motion economy as related to work place layout | 06 |
| Q.5 | (a) State the general rules to be followed while breaking the job into elements | 05 |
| | (b) What is work sampling? Where work sampling can be useful in the area of production? State steps in work sampling study. | 09 |

Section B

- | | | |
|-----|---|----|
| Q.6 | (a) Describe factor comparison method of job evaluation with its merits & demerits. | 07 |
| | (b) Define merit rating. State the characteristics. | 06 |
| Q.7 | (a) List down and explain the various steps in conducting a stop watch time study | 07 |
| | (b) Write a short note on Predetermined motion time study (PMTS). | 06 |
| Q.8 | (a) Explain the characteristics and various aspects of man-machine system. | 07 |
| | (b) Define JIT production. State the pre-requisites to achieve JIT production. | 06 |

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- Q.9 (a) Explain Kaizen Umbrella for quality improvement. 04
(b) Describe Push and Pull system of manufacturing. Explain its merits and demerits. 09
- Q.10. (a) Describe the aspects of setup activities also explain internal and external setup activities. 07
(b) Describe Toyota production system. Also mention basic assumptions of Toyota production system. 07

SUBJECT CODE NO: E-120
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mechanical) Examination Nov/Dec 2017
Elective-II: Piping System Engineering
(REVISED)

[Time: 3:00 Hours]

[Max.Marks:80]

- N.B Please check whether you have got the right question paper.
1. Solve any three questions from each section.
 2. Symbol carries usual meanings.
 3. Assume suitable data wherever necessary and state it correctly.

Section -A

- | | | |
|-----|--|----|
| Q.1 | a) Differentiate amongst safety valves and pressure relief valve. | 07 |
| | b) Sketch weldolet and socket. | 06 |
| Q.2 | Calculate pipe thickness for following condition-working pressure 1720 psi, working temperature 515F, size 10" NPS, seamless, MOC, A106 Gr.B, Take Y=0.4 | 13 |
| Q.3 | a) Present classification of flanges and gaskets with dimensional standards. | 07 |
| | b) Explain use of plastic as piping material. | 06 |
| Q.4 | a) Sketch and discuss Anchor & Shoe support. | 07 |
| | b) Explain ASME section 1 in piping. | 06 |
| Q.5 | Write notes on: (<u>any two</u>) | 14 |
| | a) Miter | |
| | b) Piping insulation & insulation symbols | |
| | c) Screwed fittings | |

Section -B

- | | | |
|------|---|----|
| Q.6 | a) Discuss steps involved and objectives of stress analysis. | 07 |
| | b) Explain catastrophic failure in piping. | 06 |
| Q.7 | a) Explain manpower deployment norms for piping erection work. | 07 |
| | b) Discuss occasional loads in piping. | 06 |
| Q.8 | Explain types of P & ID with examples state its objectives. | 13 |
| Q.9 | a) What is engineering issue, approval issue & construction issue in P & ID | 07 |
| | b) Explain plot plan in piping. | 06 |
| Q.10 | Write notes on: (<u>any two</u>) | 14 |
| | a) Costing | |
| | b) Piping for pumps | |
| | c) Water hammer | |

SUBJECT CODE NO:- E-121
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-II: Automotive Technology
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Q.No.1 & Q.No.6 are compulsory.
2. Solve any two questions from the remaining questions in each section.
3. Support your answer with figures.
4. Assume suitable data if necessary.

Section A

- Q.1 The coefficient of rolling resistance for a track having a weight 6349 kg is 0.017 and coefficient of air resistance is 0.029 in the formula $R = C_r \cdot W + K_a \cdot A \cdot V^2$, where 'A' in m^2 is frontal area & 'v' is the vehicle speed in km/hr. the transmission efficiency in the top gear of 6.7:1 is 92% and that in the second gear of 14:1 is 79%. The frontal area is $5.6 m^2$. If the truck has to have maximum speed of 92 km/hr in top gear calculate:- 10
- a) The engine brake power required
 - b) The engine speed if the driving wheel have an effective diameter of 0.82 m.
 - c) The maximum grade the truck can negotiate at above engine speed in second gear.
 - d) The maximum drawbar pull available on level at the above engine speed in second gear.
- Q.2 a) Derive the equation of maximum acceleration of the front wheel drive vehicle. 08
b) What is surplus power of the vehicle? Explain the directional stability of the vehicle for the under steer condition. 07
- Q.3 a) Explain the practical significance of four wheel drive vehicle with the neat sketch. 08
b) Explain the intake system of the turbocharger engine with a neat sketch. 07
- Q.4 a) What is vehicle drag? Explain Aerodynamic resistance of the vehicle. 07
b) What is automotive? Explain direct systems of the vehicle in brief. 08
- Q.5 a) Explain the constructional details of the piston with a neat sketch. 09
b) What are the different types of the lubricating systems of the engine? Explain one of them. 06

Section B

- Q.6 Explain the basic function, construction & working of three point seat belt with coiler. 10
- Q.7 a) Define automotive safety? Explain the types of safety systems with the examples. 08
b) Enlist the international safety standards. Explain collapsible steering system. 07

- Q.8 a) What is automotive climate control system? Explain the working of air-conditioning system in details. 08
b) Explain Hydro-gas suspension system in detail with neat sketch. 07
- Q.9 a) Explain electronic brake force distribution system in detail with a neat sketch. 09
b) Explain zero pollution vehicle in detail. 06
- Q.10 a) Explain the ignition system of the vehicle. 07
b) Discuss in details advantages of hybrid vehicle over the conventional engine vehicle. 08

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-200
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mechanical) Examination Nov/Dec 2017
I.C. Engines
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- A. Solve any three questions from each section.
 - B. Figures to the right indicate full marks.
 - C. Assume suitable data, if necessary.
 - D. Use of non programmable calculator is allowed.

Section A

- | | | |
|-----|---|----|
| Q.1 | a) Explain with the help of P-V and T-S diagram the air standard otto cycle. Obtain the thermal efficiency of otto cycle in terms of compression ratio. | 07 |
| | b) Explain with neat diagram working of 2-stroke petrol engine | 06 |
| Q.2 | a) Give advantages and disadvantages of alternative fuels | 07 |
| | b) State different types of nozzles. Explain any one | 06 |
| Q.3 | a) Explain with neat diagram any three combustion chambers used in SI engine. | 07 |
| | b) Explain time loss factor. | 06 |
| Q.4 | a) Explain with the help of P- θ diagram, different stages of combustion in SI Engine. | 07 |
| | b) What is meant by abnormal combustion? Explain the phenomenon of knock in SI engine. | 06 |
| Q.5 | Write short notes on (Any two) (i) Octane Number (ii) Fuel additives (iii) Heat loss factor | 14 |

Section –B

- | | | |
|-----|---|----|
| Q.6 | a) Explain with the help of P- θ diagram, different stages of combustion in CI Engine. | 07 |
| | b) Explain with neat diagram 'shallow depth' and 'hemispherical chamber' used in CI engine. | 06 |
| Q.7 | a) Compare knock in CI engine and SI engine | 06 |
| | b) Fuel rating for diesel engine. | 07 |

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- Q.8 a) What is supercharging? Write its advantages and limitations. 06
 b) The following readings were taken during the test of a single cylinder 4 stroke oil engine. 07
 Bore=250mm, stroke=400 mm, Gross m.e.p. = 7 bar, pumping m.e.p.=0.5 bar, engine speed = 250 rpm, Net load of the brake = 1080 N, dia of the brake= 1.5 meters, fuel used 10 kg/hr, CV = 44300 kJ/kg. Calculate i) Indicated power ii) brake power iii) Mechanical efficiency iv) Indicated thermal efficiency.
- Q.9 a) Explain the effect of engine emission on human health. 06
 b) Explain multi point fuel injection (MPFI) system 07
- Q.10 Write explanatory notes on : (Any two) 14
 i) Wankel engine
 ii) CRDI engine
 iii) Morse test

SUBJECT CODE NO: E-239
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(MECH] Examination Nov/Dec 2017
Automatic Control System
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

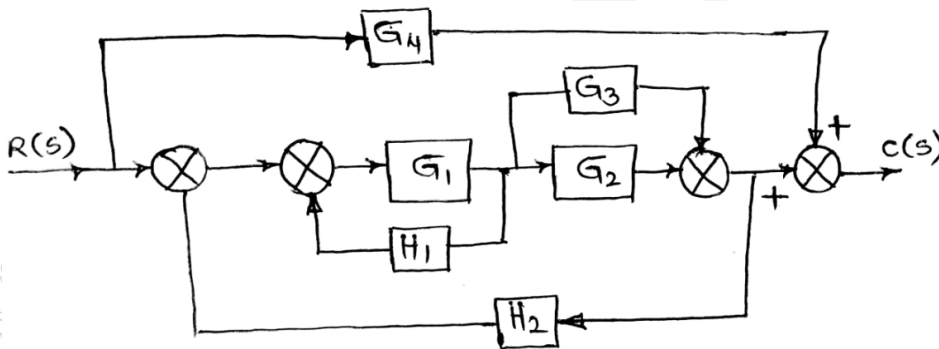
N.B

Please check whether you have got the right question paper.

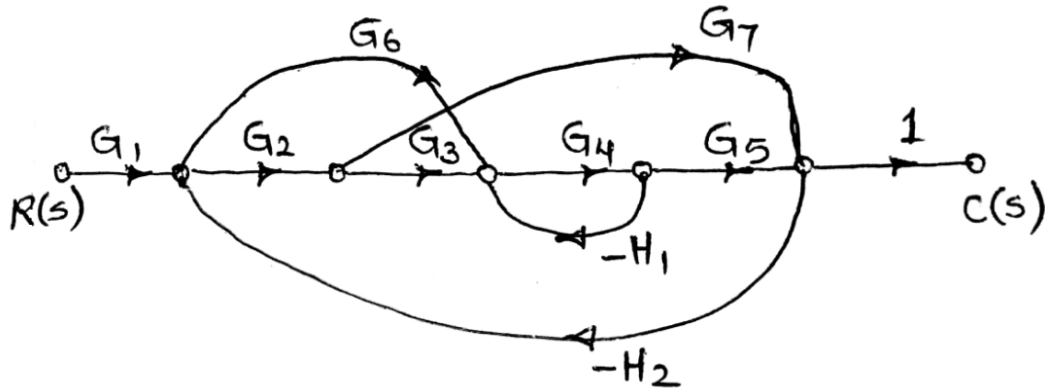
- i) Solve any three questions from each section.
- ii) Draw neat sketches if required.
- iii) Assume suitable data, if necessary.

Section A

- | | | |
|-----|--|----|
| Q.1 | a) What is Control System? Explain the generalised control system with a block diagram. | 07 |
| | b) What are the advantages of an Automatic Control System? | 06 |
| Q.2 | a) Explain in detail Force Current analogy. | 07 |
| | b) Explain the concept of Grounded chair representation. | 06 |
| Q.3 | a) Determine the transfer function for the system represented by block diagram shown in fig. | 07 |



- | | | |
|-----|--|----|
| | b) Write a short note on Electrical System. | 06 |
| Q.4 | a) Find the transfer function of the system shown by SFG in fig. | 07 |



b) Explain ON/OFF Control action with an example.

06

Q.5 Write short notes on (any two)

14

- Proportion Controller
- AC Servomotor
- Pneumatic Controllers

Section B

Q.6 a) What is the need of reference test signals. Explain any two reference test signals in detail. 07

b) Prove that the response of second order system when subjected to unit step input is,
 $c(t) = 1 - e^{-\omega_n t} (1 + \omega_n t)$

06

Q.7 a) Given the T.F, $G(S) = \frac{81}{s^2 + 9s + 81}$ find the rise time, % Overshoot, T_p and T_s .

07

b) Define the following terms (1) Second order system (2) Natural frequency of Oscillation (3) Damping ratio

06

Q.8 a) Explain the concept of phase & gain margin.

06

b) Determine the stability of $S^6 + 3S^5 + 9S^4 + 18S^3 + 27S^2 + 36S + 45$

07

- Q.9 a) For the unity feedback Control system 09

$$G(S) = \frac{10}{s(s+2)(s+10)}$$
 Sketch the bode plot and determine the gain & phase margin.
- b) Write down the importance of Semilog paper. 04
- Q.10 a) Draw the Root Locus for the following system. 10

$$G(S). H(S) = \frac{K}{s(s+5)(s+7)}$$
- b) Write down the advantages of MATLAB software for Control System. 04

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-280
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(MECH) Examination Nov/Dec 2017
Metrology and Quality Control
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- 1) Attempt three question from each section
- 2) Figure to the right indicates full marks

Section A

- | | | |
|-----|---|----|
| Q.1 | a) Define the term metrology and explain the methods of measurement | 07 |
| | b) Differentiate between line standard and end standards give their examples | 06 |
| Q.2 | a) Enlist the different types of comparators. Explain pneumatic comparator with neat sketch | 07 |
| | b) What are the various possible sources of errors in measurement? Differentiate between systematic error and random errors | 06 |
| Q.3 | a) Explain the principle of an interferometer? How is it used in the absolute measurement of slip gauge dimensions? | 07 |
| | b) Explain construction and working of laser interferometer | 06 |
| Q.4 | a) State the various sources in manufacturing gears and name the various types of errors in gears | 07 |
| | b) What is the scope CMM? Explain its different configuration with neat sketch | 06 |
| Q.5 | Writes a short note on (any three) | 14 |
| | a) Calibration | |
| | b) Types of fits | |
| | c) IS 919- 1963 | |
| | d) Universal measuring machine (UMM) | |

Section – B

| | | |
|------|---|----------|
| Q.6 | a) Define quality. Explain cost of quality and value of quality b) Explain the need and importance of TPM | 07 06 |
| Q.7 | a) Explain the cause and effect diagram with the help of suitable example b) Explain 5S and what are its benefits | 07 06 |
| Q.8 | a) Explain the use of control chart for variables and Attributes? b) Explain the characteristics of OC curve | 07 06 |
| Q.9 | a) Discuss the technique of standardization b) What is KAIZEN? Explain in details | 07 06 |
| Q.10 | Write short notes on (any three) a) Pareto analysis b) Value engineering c) ISO 9000 standards d) Process capability | 14 |

SUBJECT CODE NO: E-322
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Turbo Machines
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Solve three questions from each section.
- ii) Figure to the right indicates full marks.

Section A

- Q.1 a) Explain how the principle of dimensional analysis is applied to the turbo machines & explain their significance. 07
- b) Distinguish between a turbo machine & positive displacement machine. 06
- Q.2 a) Show that the force exerted by a jet of water on moving inclined plate in the direction of jet is given by,
$$f_x = \rho a(v - u)^2 \sin^2 \theta$$
. Where,
a = area of jet, V = Velocity of jet,
 θ = Inclination of the plate with the jet 06
- b) A 8.5 cm diameter jet having a velocity of 35 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of the jet. Find the normal pressure on the plate, when
- i) The plate is stationary 07
 - ii) When the plate is moving with a velocity of 20m/s & away from the jet.
 - iii) Also determine the power & efficiency of the jet when the plate is moving.
- Q.3 a) Obtain an expression for the force exerted by a jet of water strikes the curved plate at one end tangentially when the plate is unsymmetrical. 06
- b) A square plate of uniform thickness & length of side 300mm hangs vertically from hinge at its top edge. When a horizontal water jet strikes the plate at its centre, the plate is deflected and comes to rest at angle of 30° to the vertical. The jet is 25 mm in diameter & has a velocity of 6 m/s. Determine the weight of the plate. 07
- If the plate is not allowed to swing, what will be the force required at the lower edge of the plate to keep the plate in vertical position.
- Q.4 a) Define specific speed of a turbine derive an expression for specific speed of a turbine from fundamentals. 06
- b) What is cavitation? How can it be avoided in reaction turbines? What are the factors on which cavitation in water turbines depends explain in brief. 07

- Q.5 A pelton wheel having gross head from the reservoir to the nozzle is 390 meters. The turbine has two 14 runners with two jets per runner. All the four jets have the same diameter. The efficiency of power transmission through the pipe line & the nozzle is 91% & overall efficiency of 85%. The pelton wheel develops 95.64 kw shaft power at a speed of 200 rpm. The velocity of the bucket is 0.45 times the velocity of the jet, coefficient of velocity is equal to 0.98.

Determine :

- Total Discharge in m^3/sec .
- The diameter of wheel & jet
- Velocity of jet
- Size of bucket (width & depth)
- The force exerted by a single jet on the bucket when blade angle at outlet is 15° .

Section B

- Q.6 a) What is the role of Net Positive suction head (NPSH) in centrifugal pump? 06
- b) A centrifugal pump discharge $0.15 \text{ m}^3/\text{s}$ of water against a head of 12.5m, the speed of the impeller being 600 rpm. The outer & inner diameter of impeller are 500 mm & 250 mm respectively. The vanes are bent at an angle of 35° to the tangent at exit. If the area of flow remains 0.07 m^2 from inlet to outlet flow velocity is also same at inlet to outlet. 07

Calculate :

- Manometric efficiency of pump
- Vane angle at inlet
- Loss of head at inlet to impeller

When the discharge is reduced by 40% without changing the speed.

- Q.7 In an impulse turbine the mean diameter of the blade is 1.15 m & the speed is 3500 rpm. The nozzle angle is 19° the ratio of blade speed to steam speed is 0.42 & ratio of the relative velocity at outlet from blades to that at inlet is 0.84. The outlet angle of the blade is to be made 4° less than the inlet angle. The steam flow is 10 kg/s. 13

Calculate:

- Axial thrust,
- Tangential thrust,
- Resultant thrust,
- Power developed,
- Blading efficiency.

- Q.8 a) Sketch Brayton cycle on p-y & T-S plot and derive a relation for it's thermal efficiency in terms of pressure ratio. 06
- b) What is the difference between single stage & multistage pumps? Describe multistage pump with impeller in parallel and in series. 07

Q.9 The pressure ratio of an open-cycle gas turbine power plant is 5.6. Air is taken at 30°C & 1 bar. The compression is carried out in two stages with perfect intercooling in between. The maximum temperature of the cycle is limited to 700°C assuming the isentropic efficiency of each compressor stage as 85% and that of turbine as 90%, determine the power developed & efficiency of the power plant, if the air-flow is 1.2 kg/s. The mass of fuel may be neglected & it may be assumed that $C_{pa} = C_{pg} = 1.02 \text{ kJ / kg.k}$ & $\gamma = 1.41$.

Q.10 Write Short notes on any three of the followings.

- i) Pressure compounding of steam turbine
- ii) Reaction turbine
- iii) Stirling cycle
- iv) Pump characteristics
- v) Open cycle gas turbine

13

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-373
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-I: Energy Conservation and Management
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q.No.5&10 are compulsory.
 2. Attempt any two questions from remaining questions for each section.

Section A

- | | | |
|-----|---|----|
| Q.1 | a) Differentiate between energy conservation and energy efficiency. | 04 |
| | b) Why energy conservation is important in prevailing energy scenario? | 03 |
| | c) Define following terms with three examples | 06 |
| | i) Primary & secondary energy | |
| | ii) Commercial & non-commercial energy | |
| Q.2 | a) What do you understand by intermittent and continuous furnace? | 04 |
| | b) Discuss the various types of draft in boiler system. | 06 |
| | c) How do you measure boiler efficiency using direct method? | 03 |
| Q.3 | a) Briefly list various energy conservation opportunities in a refrigerant plant. | 04 |
| | b) Why CHP more efficient than conventional electricity generation. | 03 |
| | c) Explain the factors that effect energy efficiency in air compressors. | 06 |
| Q.4 | a) Explain clean development mechanism (CDM). | 04 |
| | b) What is intermittent and continuous blow down? | 06 |
| | c) What is NPSH of Pump & effects of inadequate NPSH? | 03 |
| Q.5 | Write short note on <u>any two</u> following. | 14 |
| | a. Kyoto protocol | |
| | b. Testing of steam traps | |
| | c. Long term energy scenario | |
| | d. Centrifugal pump | |

Section B

| | | |
|------|---|----|
| Q.6 | a) What is power factor? What are the different techniques to improve power factor? | 06 |
| | b) Explain load scheduling. | 04 |
| | c) Describe various methods for speed control of motor. | 03 |
| Q.7 | a) Explain different types of energy audit. Which type of audit is suitable for motor manufacturing industry? | 06 |
| | b) Describe 8 different energy audit instruments. | 04 |
| | c) What are different cash flow approach used in energy audit? | 03 |
| Q.8 | a) Explain different financial analysis technique? | 06 |
| | b) What is IRR? What significance it have in financial management. | 04 |
| | c) Describe role of ESCOS? | 03 |
| Q.9 | a) What are risk & sensitivity analysis in terms of energy audit. | 06 |
| | b) What do you mean by cash flow? Explain with example. | 04 |
| | c) What is life cycle cost? | 03 |
| Q.10 | Write short note on <u>any two</u> following. | 14 |
| | a. Energy policy | |
| | b. Global warming | |
| | c. Electricity Act | |
| | d. Net present value (NPV) | |

Total No. of Printed Pages:02

SUBJECT CODE NO: E-374
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-I: Power Plant Engineering
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q.1 and Q.6 are compulsory.
 - 2) Solve any two questions from each section.
 - 3) Figures to the right indicates full marks.
- Section A**
- | | | |
|-----|---|----|
| Q.1 | a) Explain selection of size and number of Generating Units. | 06 |
| | b) Explain in detail sources of energy and future trends in power industry. | 06 |
| Q.2 | a) Explain construction and working of Pneumatic Ash handling system. | 07 |
| | b) Explain how combustion takes place in Overfeed and Underfeed stoker. | 07 |
| Q.3 | a) Explain in detail cooling systems used in diesel engines. | 07 |
| | b) Explain detail layout of low capacity diesel power plant. | 07 |
| Q.4 | a) Explain in detail double classifier ball mill. | 07 |
| | b) Explain Unit System and bin system of coal Handling with advantages and disadvantages. | 07 |
| Q.5 | Write short notes | |
| | a) Tangential Burners | 05 |
| | b) Inplant Handling of Coal | 05 |
| | c) Bucket Elevators | 04 |

Section B

| | | |
|------|--|----|
| Q.6 | a) Explain in detail performance and operational characteristics of power plant. | 06 |
| | b) Explain Sodium Graphite Reactor. | 06 |
| Q.7 | a) Explain Environmental aspects of power generation. | 07 |
| | b) Explain in detail the nuclear fuels used in reactors. | 07 |
| Q.8 | a) Explain in detail working principle of BWR reactor. | 07 |
| | b) Explain with neat sketches chute spillway and Siphon Spillway. | 07 |
| Q.9 | a) Explain general components of nuclear reactor. | 07 |
| | b) Explain in detail construction and working of single jet Pelton Turbine. | 07 |
| Q.10 | Write short notes | |
| | a) Water Hammer effect | 05 |
| | b) Moderator and Control rods | 05 |
| | c) Mass Curve | 04 |

SUBJECT CODE NO: E-375
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-I: Production Planning and Control
(REVISED)

[Time: 3 Hours]

[Max.Marks:80]

- N.B Please check whether you have got the right question paper.
- Solve any three questions from each section.
 - Figures to the right indicate full marks.
 - Assume suitable data if required and state it clearly.

Section A

- Q.1 a) Describe the functions of production planning & control in brief. 06
 b) Explain the organization of production planning & control department. 07
- Q.2 a) Differentiate between job order production and batch production systems. 06
 b) Discuss the main steps in demand forecasting. 07
- Q.3 Forecast the demand for the following series by exponential smoothing method: 13

| | | | | | | | | | | |
|-------------------|----|----|---|----|---|----|----|----|----|----|
| Period: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Actual: Demand | 10 | 12 | 8 | 11 | 9 | 10 | 15 | 14 | 16 | 15 |

Take $\alpha = 0.3$

- Q.4 a) Describe in detail VED analysis. State its applications. 07
 b) What is material requirement planning? What is its purpose? 06
- Q.5 For reordering systems, describe the following systems:(Add suitable diagram) 14
 i. Two bin system
 ii. Periodic inventory ordering system.

Section B

- Q.6 a) Describe route sheet with suitable example. 06
 b) What are the factors affecting routing procedure. 07
- Q.7 a) Explain the following terms: 06
 i) Loading
 ii) Scheduling
 b) Describe bar chart as a scheduling technique. How it can be developed? 07
- Q.8 a) Define the concept of dispatching. Enlist the activities of dispatcher. 06
 b) Explain the following: 07
 i) Expediting
 ii) Application of computer in PPC.

- Q.9 a) Define JIT production. Describe characteristics of JIT production. 07
b) Explain the technology of setup time reduction. 06
- Q.10 Write short note on the following. 14
i) Lean production system (transition to lean).
ii) Kanban and pull system.

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-376
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-I: Advanced Materials and Manufacturing
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Solve any three questions from each section.
 2. Figures to the right indicate full marks.

Section-A

- | | | |
|-----|---|----|
| Q.1 | a) Classify the composites. Explain metal matrix materials. | 06 |
| | b) Describe hybrid composites, glass materials and carbon materials. | 07 |
| Q.2 | a) Explain the following. | 06 |
| | i) Particulate reinforced composites | |
| | ii) Angle plied composites | |
| | b) What are the various types of polymers? Explain their mechanical characteristics. | 07 |
| Q.3 | a) How ceramics are processed? Explain. | 06 |
| | b) Describe structure and properties of electronic ceramics, cement & concrete. | 07 |
| Q.4 | Describe the properties & applications of cutting tool materials and smart materials. | 13 |
| Q.5 | Write short notes on the following (<u>any two</u>) | 14 |
| | i) Super alloys | |
| | ii) Forming techniques of plastics | |
| | iii) Design of composite materials | |

Section-B

- | | | |
|-----|---|----|
| Q.6 | a) Explain evaporative casting process. | 06 |
| | b) Describe plaster mould casting design process. | 07 |
| Q.7 | a) What are the considerations in designing casting & molding? | 06 |
| | b) Explain principle and applications of physical vapor deposition. | 07 |
| Q.8 | a) Describe the process of electro plating. | 06 |
| | b) With neat sketch explain wire EDM process. | 07 |

Q.9 a) What are the various non-traditional debarring processes? Explain. 06

b) Explain FDM process of regenerative manufacturing. 07

Q.10 Write short notes on the following (any two) 14

i) Elements of rapid prototyping

ii) Chemical machining

iii) Water jet machining

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-377
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective-I: Modern Management Techniques
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Attempt any three questions from each section.
 2. Figure to the right indicates full marks.

Section A

- | | | |
|-----|---|----|
| Q.1 | a) With an example, explain when cause and effect diagrams are used and what results are expected to be obtained? | 07 |
| | b) Customer focus is the principle of TQM. Explain. | 06 |
| Q.2 | a) Explain various type of scatter diagram along with illustrative examples and their interpretation. | 07 |
| | b) What is six sigma environment and role of various team members? | 06 |
| Q.3 | a) What is 5 why process analysis? Explain with example. | 07 |
| | b) Explain the types of wastes which are likely in a factory. | 06 |
| Q.4 | a) What are the basic elements of JIT system? | 07 |
| | b) The tree diagram is used most often in solving problems under uncertainty, explain with example. | 06 |
| Q.5 | Write short notes on: (<u>any two</u>) | 14 |
| | a) Pareto analysis diagram | |
| | b) Poka yoke | |
| | c) Various steps of SMED process | |

Section B

- | | | |
|------|---|----|
| Q.6 | a) Explain the twelve steps of TPM implementation. | 07 |
| | b) What are the principles of value analysis? | 06 |
| Q.7 | a) What is quality function deployment? Give merits and demerits of it? | 07 |
| | b) Explain five TPM development activities. | 06 |
| Q.8 | a) By giving an example, explain practical thinking techniques? | 07 |
| | b) What is quality of work life? Explain managerial role for improving QWL. | 06 |
| Q.9 | a) What are the various elements of QWL? Explain role of each element of QWL? | 07 |
| | b) Explain how interaction and relationship between customer requirement and product requirements are evaluated in house of quality | 06 |
| Q.10 | Write short notes on: (<u>any two</u>) | 14 |
| | a) Creativity and Innovation | |
| | b) House of Quality | |
| | c) Six thinking hats | |

Total No. of Printed Pages:1

SUBJECT CODE NO: E-378
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2017
Elective - I: Non-Conventional Energy System
(REVISED)

[Time: 3 Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- Solve any three questions from each section.
 - Figures to the right indicate full marks.
 - Assume suitable data if required & state it clearly.

Section A

- | | | |
|-----|--|----|
| Q.1 | a) Describe primary, secondary and supplementary sources of energy. | 06 |
| | b) What are the various commercial or conventional major sources of energy? | 07 |
| Q.2 | a) Enlist & discuss various non-conventional energy sources. | 07 |
| | b) Define the terms i) Altitude angle ii) solar azimuth angle. | 06 |
| Q.3 | a) Describe the concept of solar radiation on tilted surface. | 06 |
| | b) What are the main applications of a solar pond? Describe briefly. | 07 |
| Q.4 | a) What are the main components of a flat plate solar collector, explain in brief. | 07 |
| | b) Explain passive solar heating system for building. | 06 |
| Q.5 | Write short note on the following.(any two) | 14 |
| | i) Solar water heater. | |
| | ii) Solar refrigeration. | |
| | iii) Solar green house. | |

Section B

- | | | |
|------|---|----|
| Q.6 | a) Describe the maximum power principle of wind energy conversion. | 06 |
| | b) What are the criterion for site selection for WECS. | 07 |
| Q.7 | Describe basic components of wind energy conversion system. (WECS) | 13 |
| Q.8 | a) Discuss variable speed constant frequency scheme of electric generation in WECS. | 07 |
| | b) Describe biomass conversion technologies. | 06 |
| Q.9 | a) Explain the factors affecting bio digestion of generation of gas (biogas). | 07 |
| | b) Discuss geothermal sources. Also state its main application. | 06 |
| Q.10 | a) With a neat schematic explain an OTEC closed cycle system. | 07 |
| | b) Describe principle of Tidal power generation. | 07 |