

Total No. of Printed Pages:4

SUBJECT CODE NO:- H-147
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Project Management and Operations Research
(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. Assume suitable data. If required.
 3. Draw neat sketches, wherever necessary.

Section A

- Q.1 a) Define operations research & discuss its characteristics. 05
- b) A man goes to market to purchase buttons. He needs at least 20 large buttons & at least 30 small buttons. The shopkeeper sells buttons in two forms, 08
- i) Boxes and ii) Cards
- A box contains 10 large and 5 small buttons and a card contains 2 large and 5 small buttons. Find the most economic way in which he should purchase the buttons, if a box costs 25 paise and a card cost 10 paise only. Solve by graphical method.
- Q.2 Solve the following LPP by “Big M” method. 14
- Maximize
 $Z = x_1 + 2x_2 + 3x_3 - x_4$;
 Subjected to,
 $x_1 + 2x_2 + 3x_3 = 15$,
 $2x_1 + x_2 + 5x_3 = 20$,
 $x_1 + 2x_2 + x_3 + x_4 = 10$,
 $x_1, x_2, x_3, x_4 \geq 0$.
- Q.3 Solve by “Two Phase” method. 13
- Maximize
 $Z = x_1 + 2x_2 + 4x_3$;
 Subjected to,
 $2x_1 + x_2 + x_3 \leq 8$,
 $3x_1 + 2x_2 + 3x_3 \leq 21$,
 $x_1 + 2x_2 + 4x_3 \geq 26$,
 $x_1, x_2, x_3 \geq 0$.

Q.4 Solve the following transportation problem for maximizing the profits. Use VAM to find the IBFS. 13

		Markets				
		1	2	3	4	
Factories	A	42	27	24	35	200
	B	46	37	32	32	60
	C	40	40	30	32	140
		80	40	120	60	

Q.5 a) 5 different operators can do any of the required 5 jobs with different profits resulting from each assignment given below. Find out the maximum profit through the optimum assignment 07

		Operators				
		A	B	C	D	E
Jobs	1	30	37	40	28	40
	2	40	24	27	21	36
	3	40	32	33	30	35
	4	25	38	40	36	36
	5	29	62	41	34	39

b) The cost of equipment is Rs. 62,000 and its scrap value is Rs. 2000. The life of equipment is 8 06 years. The maintenance cost for each years are given below.

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	1000	2000	3500	5000	8000	11000	16000	24000

When the equipment should be replaced?

Section B

Q.6 a) 4 Jobs are to be processed through 4 machines; M₁, M₂, M₃ and M₄. The processing time in hours are given below. Find the total elapsed time and idle time for each machine. 07

		Machines			
		M ₁	M ₂	M ₃	M ₄
Jobs	A	20	10	9	20
	B	17	7	15	17
	C	21	8	10	21
	D	25	5	9	25

- b) A men’s tailoring house has one tailor, specialized in men’s shirts. The no of customers requiring stitching of shirts appears to follow the Poisson’s distribution with a mean arrival rate of 12 per hour. Customers are attended by the tailor on first come, first served basis. The time tailor takes to attend the customers is exponentially distributed with a mean of 4 minutes. Calculate:-
- The traffic intensity
 - The probability that the queuing system idle.
 - What is the no of customers in the shop?
 - The average time the tailor is free on 8 hour working day.

- Q.7 a) Explain in brief the following terms with respect to game theory. 08
- Dominance property
 - Pay-off matrix
 - Saddle point
 - Two person zero-sum game

- b) Solve the following 3×4 game. 05

		Player B			
		1	2	3	4
Player A	3	3	0	-2	1
	-4	-4	-3	-1	5
	-4	-4	2	1	6

- Q.8 a) What do you mean by economic order quantity? Explain in brief. 05
- b) A stockiest has to supply 400 units of product every Monday to his customers. He gets the product at 50 Rs. Per unit, from the manufacturer. The cost of ordering & transportation from the manufacturer is Rs. 75 per order. The inventory carrying cost is 7.5% per year of the cost of the product. Find :- 08
- EOQ
 - No of orders per year
 - Total optimum cost

- Q.9 The following table gives the activities involved in a construction project and other related information. Draw the network and find the critical path. 13

Activity	t_o	t_m	t_p
1-2	6	9	18
1-3	5	6	17
2-4	4	7	22
3-4	4	7	16
4-5	4	10	22
2-5	4	7	10
3-5	2	5	8

Determine:-

- i) The expected time and variance for each activity.
- ii) The probability of completing the project in 32 days.
- iii) Which duration will ensure 95% of work completion?

Z	0.40	0.41	0.42	0.43	0.44	0.68	1.65
P (%)	65.54	65.91	66.28	66.44	67.00	75.00	95.00

Q.10 The following table shows activities with their normal time, crash time and corresponding costs. 14

Assume the indirect cost per day is Rs.100. find the optimum project time and min total project cost by crashing the appropriate activities.

Activities	Normal		Crash	
	Time (days)	Cost (Rs.)	Time (days)	Cost (Rs.)
1-2	3	300	2	400
2-3	6	480	4	520
2-4	7	2100	5	2500
2-5	8	400	6	600
3-4	4	320	3	360
4-5	5	500	4	520

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-114
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Automobile Engineering
(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. Draw neat sketches wherever necessary
 - iii. Assume suitable data, if required

Section A

- Q.1 a. What are the major or main components of an automobile? Describe all of them briefly. 08
 b. What are the advantages of diesel engines in cars? 05
- Q.2 a. With the help of a neat sketch explain the construction and working of a multi-plate clutch 07
 b. Describe briefly the parts of a plate clutch 06
- Q.3 a. Give the comparison among sliding mesh, constant mesh and synchromesh gear boxes. 07
 b. Explain with neat sketch construction and working of overdrive, what are its advantages? 06
- Q.4 a. Explain briefly the following independent suspension system used in automobiles 08
 i. Wishbone type suspension
 ii. Mac person strut
 b. State the advantages and disadvantages of independent suspension over rigid axle type suspension 05
- Q.5 a. Write short notes on (any two) 14
 i. Leaf springs
 ii. Air suspension
 iii. Automatic transmission
 iv. Differential

Section B

- Q.6 a. Explain the terms: 07
 i. Combined angle and scrub radius
 ii. Toe-in or Toe-out
 What are the effects of each on the steering characteristics of a vehicle
 b. Discuss the factors affecting oversteer and understeer 06
- Q.7 a. What do you understand by backlash in steering gears? Sketch any one steering gear and explain the constructional features provided to adjust the backlash 07

- b. Describe in details the equipment to check wheel alignment and steering geometry 06
- Q.8 a. Discuss the classification of brakes for vehicles. Explain the construction and working of disc brake with the help of neat sketch 07
 b. Explain briefly the working of air brakes. Enumerate the main parts of an air brake 06
- Q.9 a. Draw the layout of the air-conditioning system for a car and explain its working 07
 b. Explain the working principle and construction of a D.C. generator (dynamo) 06
- Q.10 a. Write short notes on(any two) 14
 i. Tubeless tyres and conventional tubes tyre
 ii. Factors affecting battery life
 iii. Tandem master cylinder and slave cylinder
 iv. Alternate (A.C. Generator)

FACULTY OF ENGINEERING AND TECHNOLOGY

B.E. (Mechanical)

Elective-II

Automotive Technology

(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Q. No. 1 & Q. No.6 are compulsory.
 - ii. Solve any two questions from the remaining questions in each section.
 - iii. Support your answer with figures.
 - iv. Assume suitable data if necessary.

Section A

- Q.1 a) A light weight truck weighting 1700kg travelling at 95 km/hr. Assume constant deceleration, ignore other resisting forces. The steady braking force applied is 10,000N. determine :- 08
- i) The deceleration
 - ii) Stopping distance
 - iii) Stopping time
 - iv) Energy dissipated
- b) A car has mass of 500kg & the velocity of 12 m/s. contact time during the collision is 1.2 seconds. Calculate the force transmit to the driver. 02
- Q.2 a) What are the resistances to a vehicle? Explain the rolling resistance of the vehicle. 08
- b) Explain the function of catalytic converter and muffler. 07
- Q.3 a) A Motor car with a wheel base of 2.9m with a centre of gravity 0.84m above the ground & 1.23m behind the front axle has a coefficient of adhesion 0.59 between the tyre & ground. The vehicle is negotiating 14° of gradient. Estimate the maximum acceleration of the following vehicle. 08
- i) All-wheel drive
 - ii) Front wheel drive
 - iii) Rear wheel drive
- b) What is slip angle? Explain directional stability of the vehicle when slip angle at front wheel is more than the slip angle at the rear wheel. 07
- Q.4 a) Define:- 08
- i) Drawbar pull
 - ii) Motor vehicle
 - iii) Vehicle dynamics
 - iv) Oversteer
- b) Differentiate between two wheel drive and four wheel drive vehicles. 07

- Q.5 a) Write the function, construction, material & the types of Piston rings. 07
 b) Explain the forced circulation cooling system of the vehicle. 08

Section B

- Q.6 What is passive safety systems? Explain Airbag system with chemical reaction in details. 10
- Q.7 a) Explain Antilock braking system in detail with a neat sketch. 09
 b) What is the purpose of vehicle security system? Explain engine immobilizer system. 06
- Q.8 a) What is HVAC system? Explain the working of heating system of HVAC in detail. 08
 b) What are the different types of advanced suspension systems? Explain Air suspension system of the vehicle. 07
- Q.9 a) Discuss the charging system of the vehicle in detail. 07
 b) What are the benefits of hybrid vehicle? Explain parallel hybrid vehicle. 08
- Q.10 a) Enlist the power assisted convenience system. Explain any one. 08
 b) Explain driverless vehicle in detail with the example. 07

SUBJECT CODE NO: H-225
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Elective-II Piping System Engineering
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Solve any three questions from Section A & any three from Section B.
 - ii) Symbol carries usual meanings.
 - iii) Assume suitable data wherever necessary and state it correctly.

Section A

- Q.1
- a) Explain the use of ASME B 31.1 in piping. 07
 - b) Discuss SMPV rules in piping. 06
- Q.2 Calculate pipe thickness of the pipe for following conditions working pressure 1640 psi, working temperature 660 F, Size 8" NPS; seamless, MOC, A 106 Gr. B, Take $Y = 0.4$. 13
- Q.3
- a) Present classification of flanges based on pipe attachment & facing. 07
 - b) Differentiate amongst Jacketed and traced piping. 06
- Q.4
- a) Sketch and explain Eccentric and concentric reducers. 07
 - b) Explain use of non-ferrous materials used in piping. 06
- Q.5 Write notes on (Any two) 14
- a) Schedule number
 - b) Instrument piping
 - c) ASME B 31.3

Section B

- Q.6
- a) Discuss the procedure for application of wrapping & coating of pipes. 07
 - b) Explain use of computers in piping. 06
- Q.7 Sketch P & ID, PFD for heat exchanger use. (Generalised Application) 13
- Q.8
- a) Illustrate what care should be taken while routing piping for instruments. 07
 - b) Explain fatigue failure in piping. 06
- Q.9
- a) Draw the piping symbols for electrical signal, roots blower, steam trap, insulation. 07
 - b) Explain how supports are used in piping. 06
- Q.10 Write notes on (Any two) 14
- a) MTO
 - b) Piping Isometrics
 - c) CADD

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-304
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
I.C. Engines
(REVISED)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Solve any three questions from each section.
 - ii) Figure to the right indicates full marks.
 - iii) Assume suitable data, if necessary.
 - iv) Use of non-programmable calculator is allowed.

Section A

- | | | |
|-----|--|----|
| Q.1 | a) State the assumption made for air standard cycle & derives the expression for thermal efficiency of a Otto cycle with usual notation. | 07 |
| | b) Explain variable specific heat and its effect. | 06 |
| Q.2 | a) Explain with neat diagram the working of 4-stroke diesel engine. | 06 |
| | b) Explain the heat loss factor. | 07 |
| Q.3 | a) What are the important properties which SI engine fuels possess? | 06 |
| | b) State different types of combustion chamber for SI engine. Explain 'T' type combustion chamber. | 07 |
| Q.4 | a) Explain combustion in SI engine. | 07 |
| | b) Explain the effects of various engine variables on SI engine knock. | 06 |
| Q.5 | Write short notes on (any two) | 14 |
| | 1. Fuel additives | |
| | 2. Octane Number | |
| | 3. Jerk type fuel pump | |

Section B

- | | | |
|-----|--|----|
| Q.6 | a) Explain with the help of P- θ diagram, different stages of combustion in CI Engine. | 07 |
| | b) Explain the phenomenon of knock in CI engines and compare it with SI engine knock. | 06 |
| Q.7 | a) Cetane rating of CI Engine fuel. | 06 |
| | b) Explain with diagram the air swirl combustion chamber with its advantages and limitations. | 07 |
| Q.8 | a) State different methods to measure friction power and explain in detail Morse test. | 06 |
| | b) A six cylinder, 4 stroke petrol engine having a bore of 90 mm and 100 mm has compression ratio of 7. The relative efficiency with reference to indicated thermal efficiency is 55% when the indicated sp fuel consumption is 0.3 kg/kwh. Estimate the calorific value of fuel and fuel consumption in kg/hr. given that the imep is 8 bar and speed is 2500 rpm | 07 |

- Q.9 a) How NO_x are formed? Explain the effect of NO_x on human health. 06
b) Explain variable valve timing engine. 07
- Q.10 Write explanatory notes on: (Any two) 14
1. Supercharging
 2. Euro Emission Norms
 3. CRDI engine.

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-290
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Prod.)
Theory of Metal Forming
(OLD)

[Time: Three Hours]

[Max.Marks:100]

Please check whether you have got the right question paper.

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

Section A

- Q.1 a) Explain vonmiser and Trescas criterion. 08
 b) Derive relationship between tensile & shear yield stresses. 08
- Q.2 Derive an equation for forging of strip. Also mention various assumptions. 18
- Q.3 a) Explain slip line field theory. 08
 b) Discuss structural changes during the metal forming processes. 08
- Q.4 A cup of inside radius 40mm & thickness 5mm is to be drawn from a blank with a radius of 50mm. 16
 The shear yield stress & maximum allowable stress of material can be taken as 14 N/mm^2 & 50 N/mm^2 . Determine
 i) Drawing force
 ii) Minimum possible radius of cup which can be drawn from given blank $\mu = 0.1$ & $\beta = 0.05$
- Q.5 a) What are the recent development in forging. 08
 b) Discuss defects in deep drawn parts. 08

Section B

- Q.6 With neat sketch explain the following 16
 i) Impact extrusion
 ii) Hydrostatic extrusion
 iii) Extrusion of brittle material
 iv) Closed cavity extrusion
- Q.7 A 5mm metal strip is rolled to a final thickness of 4mm using 100mm radius steel rollers. The 18
 tensile yield stress of material is 28 N/mm^2 . Determine
 i) Minimum coefficient of friction
 ii) Angle subtended by contact zone
 iii) Location of neutral point.

- Q.8 Derive an equation for workload in case of wire drawing operation. 16
- Q.9 a) With neat sketch explain development of centre burst defect in drawing & extrusion. 08
b) Explain upper bound & lower bound approach. 08
- Q.10 a) What are the major effects of friction on the forming processes? 08
b) What are the various lubricants used in industrial & metal working? 08

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-182
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Refrigeration and Air Conditioning
(REVISED)

[Time: Three 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 Actual vapour compression refrigeration cycle? 06
- b) Cascade refrigeration system. 07
- Q.2 a) A Carnot refrigerator requires 3.5 KW per ton of refrigeration to maintain a temp. of -30°C . 06
Determine:-
i) C.O.P of the refrigerator
ii) The temperature at which the heat is rejected
iii) The amount of heat rejected in KJ/ min.
iv) C.O.P, if the cycle is used as a heat pump.
- b) A Carnot refrigeration cycle absorbs heat at 270K & rejects it at 300K. 07
i) Calculate C.O.P of cycle
ii) If the cycle is absorbing 1130 KJ/min at 270K, how many KJ of work is required per second.
iii) C.O.P, if the cycle is used as a heat pump
iv) How many KJ/ min will the heat pump deliver at 300 K if it absorbs 1130KJ/min at 270 K.
- Q.3 A vapour compression system with ammonia as the refrigerant works between the pressure limits of 13 2 bar & 12 bar with three stage compression. The vapours leaving the water inter coolers at pressure 4 bar & 8 bar are in a saturated state. If the load is 10 TR, find the power required to drive the three compressors & compare the C.O.P of this system with that of a simple saturation cycle working between the same overall pressure limits.
- Q.4 A simple air cooled system is used for an aero plane having a load of 10 tonnes. The atmospheric 13 pressure & temperature are 0.9 bar & 10°C respectively. The pressure increases to 1.013 bar due to ramming. The temperature of the air is reduced by 50°C , in the heat exchanger. The pressure in the cabin is 1.01 bar & the temperature of air leaving the cabin is 25°C . Determine:-
i) C.O.P of the system
ii) Power required to take the load of cooling in the cabin.
Assume all isentropic expansion & compression. The pressure of the compressed air is 3.5 bar.

- Q.5 Write short note on the following (any three) 14
- i) Boot-strap air cooling system.
 - ii) Methods to improve C.O.P of VCC
 - iii) Reduced ambient air refrigeration system
 - iv) Two-stage compression with liquid intercooler
 - v) Simple VCRS

Section B

- Q.6 a) Explain simple vapour absorption system. 06
- b) Explain practical vapour absorption system. 07

- Q.7 a) Explain the necessity of finding alternative to CFC's. What are the better options available for CFC's? 07
- b) What is refrigerant? Write down designation for following refrigerant. 06
- i) Dichloro- trifluoro ethane
 - ii) Trichloro-trifluoro ethane
 - iii) Sulphur di-oxide (SO₂)
 - iv) Water (H₂O)

- Q.8 a) The humidity ratio of atmospheric air at 28^oC dry bulb temperature & 760mm of mercury is 0.016 kg/kg of dry air determine:- 07
- i) Partial press. of water vapour,
 - ii) Relative humidity
 - iii) Dew point temp,
 - iv) Specific enthalpy
 - v) Vapour density
- b) Explain sensible cooling & sensible heating. 06

- Q.9 A small office hall of 30 persons capacity is provided with summer air-conditioning system with the 13 following data,
- Outside conditions = 34^oC DBT & 28^oC WBT,*
inside conditions = 24^oC DBT & 50% Relative humidity
 Volume of air supplied = 0.4 m³/min/ person
 Sensible heat load in room = 125600 KJ/hr.
 Latent heat load in room = 42000 KJ/hr.
 Find the sensible heat factor of the plant.

- Q.10 Write short note on (any three)
- i) Steam jet refrigeration
 - ii) Human comfort
 - iii) Summer air-conditioning system
 - iv) ICE plant
 - v) GWP & ODP

Total No. of Printed Pages:3

SUBJECT CODE NO: H-407
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Turbo Machines
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

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

Section A

- Q.1 a) Define turbo – machine & give the classification in brief. 06
- b) Explain how the principle of dimensional analysis is applied to the turbo – machines and explain their significance. 07
- Q.2 a) Show that the angle of swing of a vertical hinge plate is given by, $\sin\theta = \frac{gav^2}{w}$, where. 06
V = velocity of jet striking the plate.
A = area of the jet
W = weight of the plate.
- b) A jet of water of diameter 7.5cm strikes a curved plate at its Centre with a velocity of 20m/s. the curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165° . Assuming the plate is smooth. 07
Find
i) Force exerted on the plate in the dirⁿ of jet.
ii) Power of the jet.
iii) Efficiency of the jet.
- Q.3 a) Prove that the force exerted by a jet of water on a fixed semi – circular plate in the direction of the jet when the jet strikes at the Centre of the semicircular plate is two times the force exerted by the jet on fixed vertical plate. 06
- b) A jet of water of diameter 25mm strikes a $20\text{cm} \times 20\text{cm}$ square plate of uniform thickness with a velocity of 10 m/s at the centre of the plate which is suspended vertically by a hinge on its top horizontal edge. The weight of the plate is 98.1N. The jet strikes a normal to the plate. What force must be applied at the lower edge of the plate so that plate is kept vertical. 07
If the plate is allowed to deflect freely, what will be the inclination of the plate with vertical due to the force exerted by jet of water.

- Q.4 a) Describe briefly the function of various main component of pelton turbine with neat sketches. 07
- b) What is cavitation? How can it be avoided in reaction turbines? What are the factors on which cavitation in water turbines depends. 06
- Q.5 The three – jet pelton turbine is req. to generate 10, 000 KW under a net head of 300m. The overall efficiency of the turbine is 83%. The angle of deflection of the jet is 165° if the speed ratio & specific speed is 0.46 and 16.5 respectively. If coefficient of velocity is 0.98. 14
Determine:
- Diameter of the turbine (wheel)
 - Diameter of the jet
 - Work done by a single jet on the runner per second.
 - Hydraulic efficiency of the pelton wheel.
 - No. of buckets on pelton wheel.

Section B

- Q.6 a) Define specific speed for centrifugal pump. Derive an expression for specific speed of a centrifugal pump from fundamentals. 06
- b) The internal & external diameter of an impeller of a centrifugal pump which is running at 1000 rpm are 200mm & 400mm respectively. The discharge through pipe is $0.04 \text{ m}^3 / \text{s}$ & velocity of flow is constant & equal to 2.0 m/s . The diameter of the suction & delivery pipes are 150mm & 100mm resp. suction & delivery head are 6m & 30m of water resp. If the outlet vane angle is 45° & power required to drive the pump is 16. 186KW. 07
Determine:
- Vane angle of the impeller at inlet.
 - The overall efficiency of the pump.
 - Monometric efficiency.
 - Find the rise in pressure in the impeller of a centrifugal pump.
- Q.7 a) What is bleeding in steam turbine? Describe energy losses in steam turbine. 06
- b) Discuss the influence of reheating in gas turbine by representing cycle on P - V & T –S plot. 07
- Q.8 In a single stage impulse turbine the mean diameter of the blade ring is 1 meter & rotational speed is 3000 rpm. The steam is issued from the nozzle at 300 m/s & nozzle angle is 20° . The blades are equiangular. If the friction loss in the blade channel is 19% of the K.E corresponding to the relative velocity at the inlet to the blades, what is the power developed, when axial thrust on blade is 98N. Also determine blading efficiency & resultant thrust on the blade. 13

Q.9 Air is drawn in a gas turbine unit at 15°C & 1.01bar. Overall pressure ratio of cycle is 7:1. The compressor is driven by the high pressure (H.P) turbine & low pressure (L.P) drives a separate power shaft. The isentropic efficiencies of compressor, and the H.P & L.P turbines are 82%, 85% & 85% respectively. If the maximum cycle temperature is 610°C. 14

Calculate :

- i) Work ratio
- ii) Thermal efficiency
- iii) The pressure & temp. of gases entering the power turbine
- iv) The net power developed.

Neglect mass of fuel. $C_{pg} = 1.15 \text{ KJ/kg} \cdot \text{K}$ for compression,
 $CP_a = 1.005 \text{ KJ/kg} \cdot \text{K}$, $ra = 1.4$, $rg = 1.33$.

Q.10 Write short notes on any three of the followings. 13

- i) multi – stage pumps
- ii) monometric head
- iii) compounding of steam turbine
- iv) Ericsson cycle.
- v) Closed cycle gas turbine.

SUBJECT CODE NO: H-338
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Automatic Control System
(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) Draw neat sketches if required.
 - 3) Assume suitable data, if necessary.

Section A

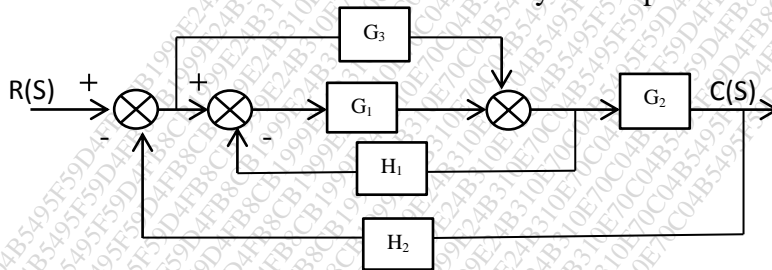
- Q.1 a) Define the terms- 07
1. Controlled variable
 2. Manipulated variable
 3. Actuating Signal
 4. Disturbance
 5. Feedback.

- b) Write short note on Mechanical system. 06

- Q.2 a) Explain in details Temperature voltage analogy. 06

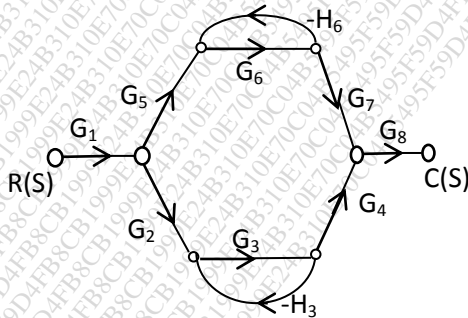
- b) Define the terms- 07
- Source, Sink, Transmittance, Path, Loop.

- Q.3 a) Determine the transfer function for the system represented by block diagram shown in fig. 07



- b) Compare AC and DC servomotor. 06

- Q.4 a) Find the transfer function of the system shown by SFG in fig. 07



- b) Explain the construction and working of stepper motor with a neat diagram. 06

- Q.5 Write short note on(Any Two) 14
- Fluid system.
 - Mason's gain Formula.
 - Feedback and Stability.

Section B

- Q.6 a) Explain Transient and steady state response. 06
 b) Derive the equation for unit impulse response of first order system. 07
- Q.7 a) The open loop T.F. of a unity feedback control system is given as $G(s) = \frac{36}{s(s+6)}$ 07
 Determine Peak time, % overshoot, T_s & T_r .
 b) Explain the effect of damping ratio on the second order control system. 06
- Q.8 a) Write a short note on relative stability. 06
 b) Check the stability for $S^5 + 18S^4 + 9S^3 + 5S^2 + 2S + 1$. 07
- Q.9 a) For the unity feedback control system $G(s) = \frac{10}{s(s+1)(s+7)}$. Sketch the bode plot and determine 09
 the gain and phase margin.
 b) What is the need of log scale? 04
- Q.10 a) Draw the Root Locus for the following system. $G(s).H(s) = \frac{K(s+1)}{s^2(s+5)}$. 10
 b) Explain the rules used for construction of Root Locus. 04

Total No. of Printed Pages:2

SUBJECT CODE NO: H-373
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
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 questions from each section.
 - 2) Figures to the right indicates full marks.

Section A

- | | | |
|-----|---|----|
| Q.1 | a) Define the term metrology and explain the need of standards of measurements in modern industrial system. | 07 |
| | b) Enlist the various instrument to be used for linear and angular measurements and explain the use of sine bar with example. | 06 |
| Q.2 | a) Explain construction and working of LVDT. | 07 |
| | b) Explain construction and working of autocollimator with the help of neat diagram. | 06 |
| Q.3 | a) Explain the working of laser interferometer with neat sketch. Give its advantages. | 07 |
| | b) Define the following terms | 06 |
| | 1. Surface texture | |
| | 2. Limit | |
| | 3. Unilateral & bilateral tolerance | |
| | 4. Interference fit | |
| | 5. Clearance fit | |
| | 6. Transition fit | |
| Q.4 | a) Explain the working of profile projector with neat sketch. | 07 |
| | b) Distinguish between coordinate measuring machine and universal measuring machine. | 06 |
| Q.5 | Write short notes on (<u>any three</u>) | 14 |
| | a) Gear tooth vernier | |
| | b) Angle décor | |
| | c) Indian standards (IS 919 – 1963) | |
| | d) Slip Gauge & its wringing | |
| | e) Tool maker microscope | |

Section B

- Q.6 a) Explain importance and use of quality circles in quality control. 06
 b) Define term standardization and write down its aims and explain codification system. 07
- Q.7 a) Explain the need and importance of TPM. 06
 b) What is acceptance sampling? Explain with example. 07
- Q.8 a) Explain KAIZEN techniques. 06
 b) What is OC curve and its characteristics? 07
- Q.9 a) Explain the use of control chart in statistical quality control. 07
 b) Enlist and explain the goals and key elements of JIT approach to manufacturing system design and operation. 06
- Q.10 Write short notes on (any three): 14
 a) Pareto analysis
 b) Cause and effect diagram
 c) ISO 9000
 d) Poka yoke

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-454
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
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) Explain with example the use of check sheet in the following types:
i. Study pattern of variability.
ii. Quantity defect by location. | 07 |
| | b) What is interrelationship diagram? Give one example. What is its relationship with Ishikawa diagram? | 06 |
| Q.2 | a) Explain evolution of six sigma approach.
b) Explain the role of set up time and lot size in JIT. | 07
06 |
| Q.3 | a) Explain various steps of a SMED process forwards significant reduction or setup.
b) What do you mean by BPR? Explain need of BPR? | 07
06 |
| Q.4 | a) What is poke-yoke? Give its purpose.
b) The tree diagram is used most often in solving problems under uncertainty, explain with examples. | 07
06 |
| Q.5 | Write short notes on(Any Two):
a) Cause and effect diagram.
b) Benefits of JIT.
c) Tree Diagram. | 14 |

Section B

- | | | |
|-----|--|----------|
| Q.6 | a) What are value analysis and value engineering? How are they related to continuous improvement?
b) Explain the techniques of QFD which helps to transform the customer needs into engineering characteristics and appropriate test methods for a product or services. | 07
06 |
| Q.7 | a) Describe the stages for introduction of TPM in an organization.
b) What is FAST analysis? Explain. | 07
06 |
| Q.8 | a) Explain the concept of lateral thinking.
b) Design QWL. Explain managerial role for improving QWL? | 07
06 |

- Q.9 a) Explain the relationship between quality of work life and work life balance. 07
b) Explain six thinking Hats. 06

- Q.10 Write note on following(Any Two) 14
a) Competitor evaluation in house of quality.
b) Distinctive features of TPM of its benefits.
c) Concept of lateral thinking.

Total No. of Printed Pages:1

SUBJECT CODE NO:- H-452
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Elective-I Production Planning and Control
(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.
 - 3) Assume suitable data if required & state it clearly.

Section A

- Q.1 a) State the principle of sound production control system. 06
 b) Explain the relationship between production planning and control. 07

- Q.2 a) Describe the internal organization of PPC department. 06
 b) Name & describe the various factors affecting forecasting. 07

Q.3 The following are available data of sales in lakhs of rupees: 13

Year	2005	2006	2007	2008	2010
Sales	50	70	60	80	90

Assume same relationship holds true for future, forecast the sales for the year 2015 by applying least square method.

- Q.4 a) Describe briefly the ABC and VED analysis of inventory control. 07
 b) What is economic order quantity? Derive the formula for determining EOQ. 06

- Q.5 Write short note on the following: 14
 a) Line of balance (LOB).
 b) Material Requirement planning(MRP)

Section B

- Q.6 a) Name and describe the various inventory models in brief. 08
 b) Describe the route sheet with suitable example. 05

- Q.7 a) What is scheduling? How does it differ from loading? State the objective of scheduling. 10
 b) Enlist factors affecting routing procedure. 03

- Q.8 a) Explain Gantt process chart as a technique for scheduling. 07
 b) Differentiate between centralised dispatching and dis-centralised dispatching. 06

- Q.9 a) Define JIT production, state the prerequisites to achieve JIT production. 07
 b) Explain JIT purchasing technique for mistake proofing process. 06

- Q.10 Write short note on the following: 14
 a) Setup time reduction technology.
 b) Types of follow up.

Total No. of Printed Pages:01

SUBJECT CODE NO:- H-451
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
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) Solve any two questions from each section.
 - 2) Figures to the right indicate full marks.
 - 3) Q.1 and Q.6 are compulsory.

Section A

- | | | |
|-----|--|----|
| Q.1 | a) Explain in detail sources of Energy and future trends in Power industry. | 06 |
| | b) Explain in detail demand factor, capacity factor, use factor and diversity factor. | 06 |
| Q.2 | a) Explain in detail general layout of a thermal power plant. | 07 |
| | b) Explain in detail electrostatic precipitator. | 07 |
| Q.3 | a) Explain in detail general layout of diesel engine power plant. | 07 |
| | b) Explain present trends in diesel research. | 07 |
| Q.4 | a) Explain the construction and working of pneumatic ash handling system. | 07 |
| | b) Explain the advantage and limitations of diesel power plant over thermal power plant. | 07 |
| Q.5 | Write short notes. | |
| | a) Overfeed stokers. | 05 |
| | b) Bucket elevators. | 05 |
| | c) Supercharging of diesel engines. | 04 |

Section B

- | | | |
|------|--|----|
| Q.6 | a) Explain in detail cost of energy production and tariffs of electrical energy. | 06 |
| | b) Explain in detail working principle of BWR reactor. | 06 |
| Q.7 | a) Explain water Hammering Effect and importance of surge tank. | 07 |
| | b) What is penstock and material for penstock? | 07 |
| Q.8 | a) Explain advantages of hydroelectric power plant. | 07 |
| | b) What is Kaplan Turbine? | 07 |
| Q.9 | a) Explain methods of radioactive waste disposal. | 07 |
| | b) Explain characteristic feature of PWR. | 07 |
| Q.10 | Write short notes on. | |
| | a) Nuclear fission and nuclear fusion. | 05 |
| | b) Components of nuclear reactor. | 05 |
| | c) Mass curve. | 04 |

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-223
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mechanical)
Elective-II Industrial Engineering
(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) Figure to the right indicates full marks.
 - 3) Assume suitable data if required & State it clearly.
- SECTION – A**

- | | | |
|-----|---|----|
| Q.1 | a) Define productivity and production. Also discuss its relationship with each other. | 06 |
| | b) Explain dynamics of productivity change and how it brings about chain reaction throughout the society. | 07 |
| Q.2 | a) What constitutes excess work content? What are the techniques to reduces excess work content. | 07 |
| | b) Discuss the relationship between work study and the workers. | 06 |
| Q.3 | a) Critical examination forms the basis for methods improvements explain. | 07 |
| | b) What are therbligs? Give any five therbligs with symbols. | 06 |
| Q.4 | a) Construct a man type flow process chart for: “writing a letter”. | 07 |
| | b) Explain method study procedure. | 06 |
| Q.5 | Write short notes on the following: (any two) | 14 |
| | i) Principles of motion economy related to design of tools and equipment. | |
| | ii) Characteristics and aspects of man – machine system. | |
| | iii) Human anthropometry and its use in work place layout. | |

SECTION – B

- | | | |
|-----|---|----|
| Q.6 | a) List down the various steps in conducting a stop watch time study. | 06 |
| | b) Outline the general procedure for a work sampling study to determine the extent of delays and personal time. | 07 |

- Q.7 a) A work study was conducted in machine shop. Following data has been recorded: 09
 Total no. of observations = 2000,
 No activity = 500, Ration between manual to machine = 3:1
 Average performance rating = 85%
 Total number of Pieces Produced = 120
 Duration of the study = 60 hrs.
 Calculate standard time/ piece assuming 15% relaxation allowance.
- b) Explain predetermined motion time study. 05
- Q.8 a) Explain the westing house method of performance rating. 07
- b) Describe various methods of job evaluation giving their advantages and limitations. 06
- Q.9 a) Discuss kaizen umbrella for quality improvement. 06
- b) Explain Kaizen related to 07
- (i) TQC
 (ii) Innovation
- Q.10 Write short note on the following (any two): 14
- i) Toyota production system.
 ii) Push and Pull system of manufacturing
 iii) Single minute exchange of dies