

**B.L.D.E.A's V.P.Dr.P.G.HALAKATTI COLLEGE OF ENGINEERING AND
TECHNOLOGY VIJYAPUR 586103**

INDEX FILE 7 & 8th SEMESTER QUESTION PAPERS JAN/FEB 2023

5th, 7TH and 8th SEMESTER

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17ME71

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Energy Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Interpret Indian Energy Scenario with respect to production and consumption using relevant statistics. (10 Marks)
b. Explain with neat sketch, working travelling Grate Stoker and their Advantages. (10 Marks)

OR

- 2 a. What is pulverized fuel? With a neat sketch, explain the working of Tangential Burner. (10 Marks)
b. Determine the height of the chimney to produce a static draught of 22mm of water, if the mean flue gas temperature in chimney is 290°C and ambient temperature in boiler house is 20°C. The gas constant for air is 29.26kg-m/kg K and for chimney flue gas is 26.2 kg-m/kg K. Assume 760mm of Hg. (10 Marks)

Module-2

- 3 a. Draw a schematic diagram of diesel engine power plant and describe it in brief. (10 Marks)
b. With a neat sketch explain :
i) Air Intake system
ii) Lubrication system. (10 Marks)

OR

- 4 a. Draw the general layout of hydro – electric power plant and explain the functions of each. (10 Marks)
b. The mean monthly discharge of 12 months of a particular site is as shown below .

Month	Discharge, m ³ /sec	Month	Discharge, m ³ /sec
Jan	100	Jul	1000
Feb	200	Aug	1200
Mar	375	Sep	850
Apr	600	Oct	600
May	750	Nov	400
Jun	875	Dec	200

- i) Draw hydrograph and find mean flow
ii) Draw flow duration curve
iii) Find the power in MW available at mean flow, if the head available is 80m and overall efficiency of generation is 85%. (10 Marks)

Module-3

- 5 a. With a neat sketch, explain the working of a Sunshine Recorder. (10 Marks)
b. Determine the local apparent time and declination at a location latitude 77°30'E at 12:30 IST on June 19. Equation of time correction is given from standard table as -(1' 01"). (10 Marks)

OR

- 6 a. What are the main advantages of solar - cell? Explain the conversion of solar energy to electricity through photo voltaic cell. (10 Marks)
- b. Explain latent heat storage concept. Explain the properties of materials used in latent heat storage. Comment on latent heat storage materials. (10 Marks)

Module-4

- 7 a. With usual notations, derive an expression for the maximum power output of horizontal Axis Wind turbine. (10 Marks)
- b. Explain the factors considered for the selection of wind machines. (10 Marks)

OR

- 8 Explain with sketches the tidal patterns and working of a tidal plant. (10 Marks)
- d. With neat sketch, Explain horizontal axis wind machine. Mention its advantage and limitations. (10 Marks)

Module-5

- 9 a. Describe the photosynthesis process with relevant chemical reactions. Also explain the importance of photosynthesis in bio fuel generation. (10 Marks)
- b. How are the gasifiers classified? With a schematic diagram, explain the working of down draft gasifier. (10 Marks)

OR

- 10 a. What is the work of fuel cell? Explain typical H_2O_2 fuel cell with a neat sketch. (10 Marks)
- b. With a neat sketch, explain MHD power generation. (10 Marks)

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17ME72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Fluid Power Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the functions of six basic components used in the fluid power system. (06 Marks)
- b. State Pascal's law and explain the application of Pascal's law with simple sketch. (06 Marks)
- c. Explain the desirable properties of hydraulic fluids. (08 Marks)

OR

- 2 a. Explain with neat sketches, the different types of seals used in a fluid power system. (08 Marks)
- b. With the help of neat sketch, explain full flow filter and proportional flow filter. (08 Marks)
- c. Write a note on Heat Exchanger. (04 Marks)

Module-2

- 3 a. With the aid of a neat sketch, explain the principle of operation of axial piston pump. (08 Marks)
- b. A hydraulic pump has a displacement volume of 120 cm^3 . Its actual flow rate is $1.5 \times 10^{-3} \text{ m}^3/\text{s}$ at 900 rpm and 75 bars. If the prime mover input torque is 150 N-m, determine:
 - (i) The theoretical torque required to operate the pump and
 - (ii) The overall efficiency of the pump (08 Marks)
- c. List the various types of hydraulic accumulators. (04 Marks)

OR

- 4 a. Explain single acting and double acting hydraulic cylinders with diagrams and their graphic symbols. (10 Marks)
- b. A hydraulic motor operating at 75 bar pressure has a volumetric displacement of $175 \text{ cm}^3/\text{rev}$. The motor runs at 2000 rpm to deliver a torque of 175 N-m, while using a flow rate of 375 Lpm. Determine the volumetric, mechanical and overall efficiencies. Also determine the actual power delivered by the motor. (10 Marks)

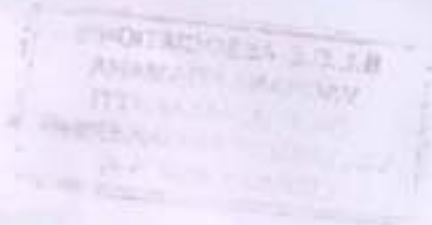
Module-3

- 5 a. With a neat sketch, explain the working of 4/2 manually operated DC valve and compound pressure relief valve. (12 Marks)
- b. Explain with a neat circuit diagram, the working of a Regenerative circuit. (08 Marks)

OR

- 6 a. With a neat circuit diagram, explain the working of double pump hydraulic system. (10 Marks)
- b. Explain the working of meter-in and meter-out circuit for controlling the speed of hydraulic cylinder. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42-8 = 50, will be treated as malpractice.



Module-4

- 7 a. What are the advantages, limitations and applications of pneumatic system? (08 Marks)
- b. Sketch and explain the mechanism end position cushioning of pneumatic cylinder. (08 Marks)
- c. List the characteristics of compressed air. (04 Marks)

OR

- 8 a. Explain with a neat sketch the construction and working of quick exhaust valve. (08 Marks)
- b. Explain the working of lubricator used in pneumatic system with a neat sketch. (08 Marks)
- c. List the various types of air compressors. (04 Marks)

Module-5

- 9 a. Explain direct actuation and indirect actuation of pneumatic cylinder with a neat circuit diagrams. (10 Marks)
- b. Explain with a neat circuit diagram supply air throttling and exhaust air throttling. (10 Marks)

OR

- 10 a. Explain the working of a solenoid controlled pilot operated direction control valve. (08 Marks)
- b. Explain the controlling of pneumatic cylinders in a sequence as A⁺ B⁻ B⁺ A⁻ by cascading method. (12 Marks)

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17ME753

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Mechatronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the objectives of mechatronics. (05 Marks)
- b. Explain the elements of mechatronics system design. (08 Marks)
- c. Explain with a neat diagram the working of photoemissive transducer. (07 Marks)

OR

- 2 a. Explain the evolution levels of mechatronics. (08 Marks)
- b. Explain the specifications of a transducer or sensor. (06 Marks)
- c. Write a note on proximity switches. (06 Marks)

Module-2

- 3 a. Explain briefly the basic elements of a microprocessor. (05 Marks)
- b. Explain the requirements for control and their implementation in a micro controller. (05 Marks)
- c. Explain briefly the following : (10 Marks)
 i) State ii) Bus iii) Flags iv) Interrupts.

OR

- 4 a. Distinguish between operand, mnemonics and opcode. (03 Marks)
- b. Explain the different types of instructions and addressing modes of a microprocessor. (09 Marks)
- c. Explain the classification of micro controllers. (08 Marks)

Module-3

- 5 a. Write the features of a typical PLC. What is a ladder diagram and explain the various symbols used in a ladder diagram. (10 Marks)
- b. Explain with a neat diagram the functional requirements of an industrial robot? (10 Marks)

OR

- 6 a. Explain Latching with an example. (06 Marks)
- b. Explain the methods used for input/output processing (06 Marks)
- c. Explain with neat sketch a typical pneumatic actuator system for Servo control. (08 Marks)

Module-4

- 7 a. Explain the mechanical aspects of motor selection and also motor torque – speed characteristics. (09 Marks)
- b. How do you classify electrical systems? (03 Marks)
- c. Explain with a neat sketch the working of single phase squirrel cage induction motor. (08 Marks)

OR

- 8 a. Write a detailed note on permanent magnet DC motor. (10 Marks)
- b. Explain with a neat diagram the stepper motor specifications of characteristics. (10 Marks)

Module-5

- 9 a. Compare with neat diagrams the hydraulic and pneumatic power supplies. (10 Marks)
- b. Explain with neat diagram the working of pressure limiting and pressure sequence valves. (10 Marks)

OR

- 10 a. Explain with neat diagrams the working of lift and pilot operated systems. (10 Marks)
- b. Explain with a neat diagram the following :
- i) Double acting cylinder
- ii) Vane motor. (10 Marks)

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18ME71

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Control Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a block diagram, explain automobile speed closed control system. (10 Marks)
- b. List and explain requirements of an ideal control system. (10 Marks)

OR

- 2 a. Explain: (i) Proportional controller (ii) Derivative controller (10 Marks)
- b. Obtain transfer function for armature controlled D-C motor. (10 Marks)

Module-2

- 3 a. Explain typical test signals in control system. (10 Marks)
- b. Determine order and type for open and closed loop control system as shown in Fig.Q3(b). (10 Marks)

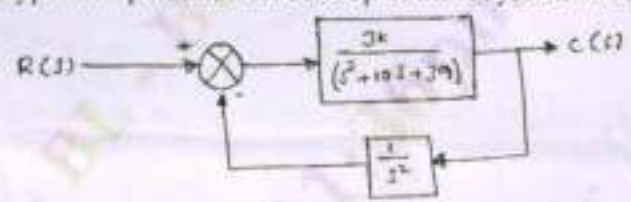


Fig.Q3(b) (10 Marks)

OR

- 4 a. Define: (i) Delay time (ii) Rise time (iii) Peak time (iv) Maximum overshoot (v) Settling time (10 Marks)

b. A unity feedback system is characterized by open loop transfer function $G(s) = \frac{16}{s^2 + 2s + 16}$

- Determine the following when the system subjected to unit step input :
- (i) Undamped not usual frequency (ii) Damping ratio (iii) Peak overshoot
 - (iv) Peak time (iv) Settling time (10 Marks)

Module-3

- 5 a. Reduce the block diagram as shown in Fig.Q5(a) to simple form and find transfer function:

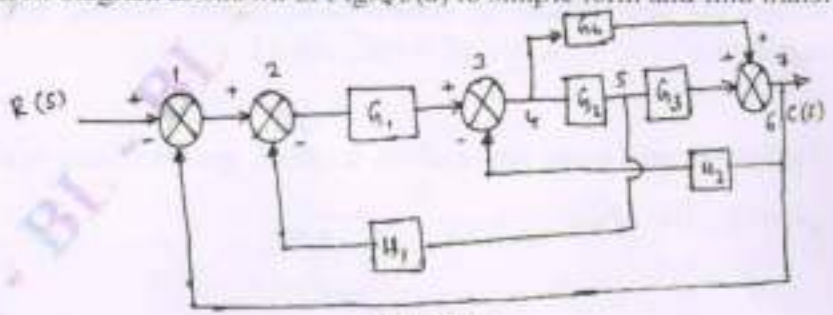


Fig.Q5(a) (10 Marks)

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- b. Obtain transfer function of block diagram shown in Fig.Q5(b) by reduction technique.

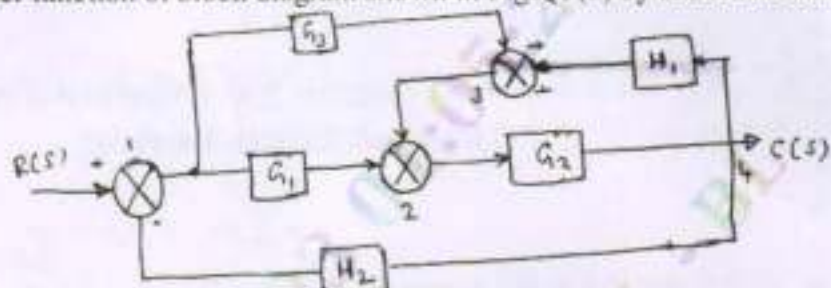


Fig.Q5(b)

(10 Marks)

OR

- 6 a. For the system shown in Fig.Q6(a), determine $\frac{C(s)}{R(s)}$ using Mason's gain formula.

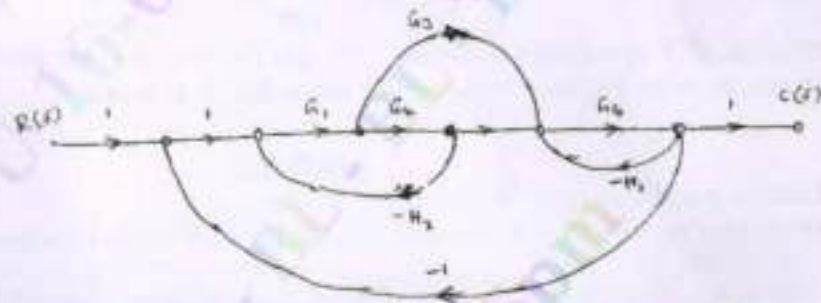


Fig.Q6(a)

(10 Marks)

- b. Using SFG and Mason's gain formula, obtain the overall transfer function of system shown in Fig.Q6(b).

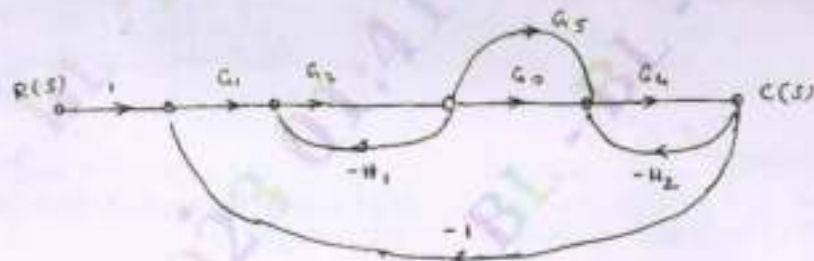


Fig.Q6(b)

(10 Marks)

Module-4

- 7 a. Applying Routh criterion, discuss the stability of closed loop system as function for open loop transfer function:

$$G(s)H(s) = \frac{K(s+1)}{s(s-1)(s^2+4s+16)} \quad (10 \text{ Marks})$$

- b. Investigate the stability of system using Routh Hurwitz criterion having characteristic equation $s^5 + 4s^4 + 12s^3 + 20s^2 + 30s + 100 = 0$ (10 Marks)

OR

- 8 Sketch the root locus for negative feedback system whose open loop transfer function is

$$\text{given by } G(s)H(s) = \frac{K}{s(s+3)(s^2+3s+4.5)} \quad (20 \text{ Marks})$$

Module-5

- 9 a. Sketch polar plot for transfer function $G(s) = \frac{10}{s(s+1)(s+2)}$. (10 Marks)
- b. Open loop function control system $G(s)H(s) = \frac{1}{s^2(s+2)}$, sketch Nyquist plot and ascertain stability. (10 Marks)

OR

- 10 A unity feedback control system has $G(s) = \frac{80}{s(s+2)(s+20)}$. Draw the Bode plot if phase cross over occur at $\omega = 6.35$ rad/sec, find the corresponding gain margin. (20 Marks)

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18ME72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Computer Aided Design and Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Automation? List different types of automation and discuss with an example. (10 Marks)
- b. Define : (i) Production rate
(ii) Production capacity
(iii) Utilization and availability
(iv) MLT and WIP (10 Marks)

OR

- 2 a. Sketch and explain any two types of Automated flow lines. (10 Marks)
- b. The ideal cycle time of an 16 station transfer line is 1.4 min. The average down time per line will be 6 min and the probability of break downs per cycle is equal for all cycles and is equal to 0.004. Determine production rate and line efficiency by considering both upper bound and lower bound approaches. (10 Marks)

Module-2

- 3 a. Briefly explain design process and the application of computer in design process. (10 Marks)
- b. Explain the following in detail:
Translation , Rotation , Concatenation and benefits of CAD. (10 Marks)

OR

- 4 a. What do you understand by CAPP? With a block diagram explain Generative System. (10 Marks)
- b. Write a note on MRP Inputs and Outputs, Benefits of MRP. (10 Marks)

Module-3

- 5 a. Define Group Technology, List various types of FMS and benefits of FMS. (10 Marks)
- b. What do you mean by As/Rs? Explain briefly about Part Identification System. (10 Marks)

OR

- 6 a. A manual assembly line has to accomplish 10 work elements to complete the assembly. The element times and precedence requirements are listed in the table. The production rate of the line is 60 units per hour. The efficiency of the line is 95% and the repositioning time is 3 sec. Use Kilbridge and Westers method to balance the line and compute balance delay and balance efficiency.

Element	1	2	3	4	5	6	7	8	9	10
T_e (min)	0.3	0.4	0.3	0.2	0.4	0.1	0.5	0.6	0.4	0.6
Preceded by	-	-	1	1, 2	2	3, 4	4	5	6, 7	8, 9

- b. From above data compute balance delay and balance efficiency using RPW method. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-4

- 7 a. Define CNC. Enlist various advantages / disadvantages and application of CNC. (10 Marks)
 b. List few G and M codes you came across and write a program to cut the profile shown in Fig.Q7(b).

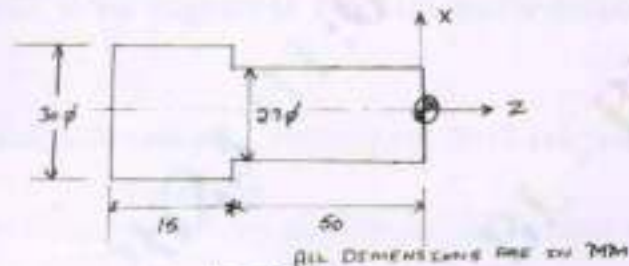


Fig.Q7(b)

(10 Marks)

OR

- 8 a. With neat sketches show robot components and joints. (10 Marks)
 b. List various configuration of a Industrial robot, sketch and draw in detail. (10 Marks)

Module-5

- 9 a. Discuss the basic principles of additive manufacturing and list various advantages / limitations of AM technique. (10 Marks)
 b. Explain the process in brief photopolymerization, material jetting. (10 Marks)

OR

- 10 a. Describe Slicing in AM. (10 Marks)
 b. Explain the following :
 (i) Direct Energy deposition (ii) Sheet lamination. (10 Marks)

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Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Total Quality Management

Time: 3 hrs.

Max. Marks: 100

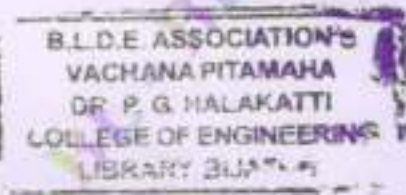
Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Quality. Explain quality in daily life in middle age during Industrial revolution. (10 Marks)
- b. What are the factors affecting Quality? (10 Marks)

OR

- 2 a. Explain the list of dimension of Quality. (10 Marks)
- b. Explain the contribution of Gurus Quality. (10 Marks)



Module-2

- 3 a. Explain the Modern method of Leadership. (10 Marks)
- b. What are the duties of Quality Control? (10 Marks)

OR

- 4 a. Mention the Deming's Philosophy of 14 points. (10 Marks)
- b. What are the future requirements for the short and long term factors affects in the Organisation? (10 Marks)

Module-3

- 5 a. Explain with neat sketch, the Kano model. (10 Marks)
- b. What are the elements present in structure of Quality circle? (10 Marks)

OR

- 6 a. Mention the Tangible and Intangible benefits through TQM. (10 Marks)
- b. Who was Malcolm Baldrige? What is the Malcolm Baldrige National Quality Award? What was the award established? (10 Marks)

Module-4

- 7 a. What is Six Sigma? Define Six Sigma and phases of Six Sigma. (10 Marks)
- b. With neat analysis of graph, explain Pareto Analysis. (10 Marks)

OR

- 8 a. Define Process of Operation of Quality circle and steps. (10 Marks)
- b. What are the benefits of Forming Quality circles? (10 Marks)

Module-5

- 9 a. What is meant by Total Productive Maintenance, with an example? (10 Marks)
- b. Define Quality by Design in TQM and What are elements of Quality by design? (10 Marks)

OR

- 10 a. Define the Environmental Management Systems and what is the importance. (10 Marks)
- b. Explain EMS under ISO 14001. What is the cost and benefits? (10 Marks)

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18ME741

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Additive Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Additive Manufacturing process. List out advantages and disadvantages of Additive Manufacturing process in detail. (06 Marks)
- b. Explain Additive Manufacturing process chain with block diagram. (08 Marks)
- c. Differentiate between Additive Manufacturing and CNC. (06 Marks)

OR

- 2 a. Explain the classification of Additive Manufacturing process. (10 Marks)
- b. Write a note on :
i) Reverse Engineering Technology ii) Computer Aided Design Technology. (10 Marks)

Module-2

- 3 a. With a neat sketch, briefly explain principle operation of Stereolithography. State its applications. (10 Marks)
- b. Explain the principle operation of selective laser sintering with neat sketch. List the advantages of SLS. (10 Marks)

OR

- 4 a. List the advantages and disadvantages of Powder bed fusion process. (06 Marks)
- b. Sketch and explain Fused Deposition Modelling [FDM] process. Also add a note on FDM materials. (10 Marks)
- c. List the various materials which may be used for electro beam melting process. (04 Marks)

Module-3

- 5 a. Describe three dimensional printing process, with a neat sketch. (10 Marks)
- b. Explain Principle of Operation and application of LOM. (10 Marks)

OR

- 6 a. With a neat sketch, explain Beam Deposition process and list its advantages and disadvantages. (10 Marks)
- b. List the various Direct write technologies and explain Ink based direct write process. (10 Marks)

Module-4

- 7 a. Discuss guidelines for process selection in AM. (08 Marks)
- b. Write a short note on STL file. (06 Marks)
- c. Discuss problems occurred with STL file. (06 Marks)

OR

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 8 a. Explain Post processing of Additive Manufacturing parts. (10 Marks)
b. Explain steps involved in property enhancement using thermal technique and non thermal technique. (10 Marks)

Module-5

- 9 a. Explain Multi Material Manufacturing process and state its applications. (10 Marks)
b. Explain the applications of Additive Manufacturing process in various fields. (10 Marks)

OR

- 10 a. Explain use of Pattern prepared by AM process for investment casting. (10 Marks)
b. Write a note on :
i) Align technology ii) DDM drives. (10 Marks)

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Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Energy and Environment

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- | | | |
|---|--|------------|
| 1 | a. Differentiate between Energy and Power. | (04 Marks) |
| | b. Explain different forms of Energy. | (06 Marks) |
| | c. Explain the key trend in India Energy Scenario. | (10 Marks) |

OR

- | | | |
|---|---|------------|
| 2 | a. List the factors affecting India's Energy Development. | (06 Marks) |
| | b. Explain the demographic policy of Energy in India. | (06 Marks) |
| | c. Explain Energy process and affordability. | (08 Marks) |

Module-2

- | | | |
|---|---|------------|
| 3 | a. Explain the necessity of Thermal Energy Storage system with suitable examples. | (10 Marks) |
| | b. Explain any Two Mechanical Energy storage systems with neat diagram. | (10 Marks) |

OR

- | | | |
|---|---|------------|
| 4 | a. Define Energy Management. Explain the Principles of Energy Management. | (10 Marks) |
| | b. Explain the type of Pre-audit and Detailed audit. | (10 Marks) |

Module-3

- | | | |
|---|---|------------|
| 5 | a. What is need for studying Environmental issues? | (06 Marks) |
| | b. What is the scope of Environmental education? | (06 Marks) |
| | c. How would Environmental awareness help to protect our Environment? | (08 Marks) |

OR

- | | | |
|---|---|------------|
| 6 | a. Write a short notes on :
i) Tropical rain forest ii) Savannas iii) Arctic Tundra. | (10 Marks) |
| | b. What are the Ecological pyramids? Explain why some of these pyramids are upright while others are inverted in different ecosystem. | (10 Marks) |

Module-4

- | | | |
|---|---|------------|
| 7 | a. Briefly describe the sources, effects and control of noise pollution. | (10 Marks) |
| | b. What are the natural and man made pollutants that cause Air pollution? | (10 Marks) |

OR

- | | | |
|---|--|------------|
| 8 | a. Write a short note on :
i) Bhopal gas tragedy ii) Love canal tragedy. | (10 Marks) |
| | b. How can you as an individual, prevent environmental pollution? Why such an effort at individual level is important? | (10 Marks) |

Module-5

- 9 a. What are the major implications of enhanced global warming? Explain. (10 Marks)
b. Write a critical note on Nuclear Holocaust. (10 Marks)

OR

- 10 a. Discuss the salient features of : (10 Marks)
i) Wild Life (Protection) Act 1972.
ii) Forest (Conservation) Act 1980.
b. What are the different methods to propagate Environmental awareness in the Society? (10 Marks)

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Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Automotive Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Compare Wet and Dry Liners with the help of diagrams. (10 Marks)
- b. Sketch and explain any two types of combustion chambers of S.I Engine. (10 Marks)

OR

- 2 a. Why cooling of Engine is necessary? Sketch and explain Thermosiphon cooling system. (10 Marks)
- b. Explain Dry sump lubrication system with the help of figure. (10 Marks)

Module-2

- 3 a. Explain the principle of Friction clutches and draw the diagram of cone clutch. (10 Marks)
- b. Sketch and explain Hotchkiss Drive and Torque Tube Drive. (10 Marks)

OR

- 4 a. Sketch and explain Disc brake and Drum brake. (10 Marks)
- b. Describe the Hydraulic Braking system with figure. (10 Marks)

Module-3

- 5 a. Define the following with figure
 i) Camber ii) Caster iii) King pin inclination iv) Toe - In and Toe-out (10 Marks)
- b. With the help of sketches, explain the working of leaf spring and coil springs. (10 Marks)

OR

- 6 a. Describe Battery Ignition system. (10 Marks)
- b. Sketch and explain the Electronic Ignition system. (10 Marks)

Module-4

- 7 a. Distinguish between super charger and turbo charger and explain the working of centrifugal type of super charger with figure. (10 Marks)
- b. Explain the Fuel mixture requirements for S.I Engines. Mention the limitations of simple carburetors. (10 Marks)

OR

- 8 a. Explain the normal and abnormal combustion in S.I. Engine with the help of pressure Vs crank angle diagram. (10 Marks)
- b. Sketch and explain Common Rail Direct Injection System. (10 Marks)

Module-5

- 9 a. List the various pollutants and explain the measures to be taken to reduce pollution. Mention the effects of the pollution on human health. (10 Marks)
- b. Sketch and explain closed crank case ventilation. (10 Marks)

OR

- 10 Write short notes on :
 i) Catalytic converter ii) Emission standards iii) Exhaust Gas Recirculation
 iv) Motor Vehicle Act Concerning to INSURANCE AGAINST THIRD PARTY RISKS. (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

CBCS SCHEME

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17ME81

Eighth Semester B.E. Degree Examination, Jan./Feb. 2023 Operations Research

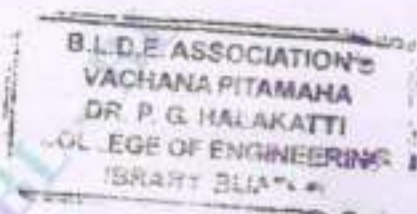
Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Normal distribution table permitted.

Module-1

- 1 a. Define Operation Research and discuss the phases in Operation Research. (10 Marks)
b. Solve graphically the given LP problem.
Minimize $z = 3a + 5b$
Subjected to constraints, $-3a + 4b \leq 12$
 $2a - 1b \geq -2$
 $2a + 3b \geq 12$
 $1a + 0b \geq 4$
 $0a + 1b \geq 2$
 $a, b \geq 0$



(10 Marks)

OR

- 2 a. List any 4 characteristics and limitations of OR. (08 Marks)
b. Two alloys A and B are made from four different metals I, II, III and IV according to the following specifications. 'A' at most 80% of I at most 30% of II, at least 50% III. 'B' between 40% and 60% of II, at least 30% of III, at most 70% of IV. The four metals are extracted from 3 different ores whose constituents percentage of these metals, maximum available quantity and cost per tonne are as follows:

Ore	Max Quantity	Constituent %					Price (Rs./Tonne)
		I	II	III	IV	Others	
1	1000	20	10	30	30	10	30
2	2000	10	20	30	30	10	40
3	3000	5	5	70	20	0	50

Assuming the selling price of alloys A and B are Rs.200 and Rs.300/tonne respectively. Formulate the above as a linear programming problem selecting appropriate objectives and constraints functions. (12 Marks)

Module-2

- 3 a. Solve the following LPP by Simplex method:
Maximize $z = 12x_1 + 16x_2$
Subject to Constraints $10x_1 + 20x_2 \leq 120$
 $8x_1 + 8x_2 \leq 80$
 $x_1 \text{ and } x_2 \geq 0$. (10 Marks)
- b. Minimize $z = 7x_1 + 15x_2 + 20x_3$
Subject to Constraints $2x_1 + 4x_2 + 6x_3 \geq 24$
 $3x_1 + 9x_2 + 6x_3 \geq 30$
 $x_1, x_2, x_3 \geq 0$
using Big M method. (10 Marks)

1 of 4

OR

- 4 a. Solve the following LPP by simplex,

$$Z \text{ Min} = 2x_1 - 3x_2 + 6x_3$$

$$\text{Subject to Constraints } 3x_1 - x_2 + 2x_3 \leq 7$$

$$2x_1 + 4x_2 \geq 12$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10$$

$$x_1, x_2, x_3 \geq 0$$

(10 Marks)

- b. Solve by dual simplex method.

$$\text{Min } z = 5x_1 + 6x_2$$

$$\text{Subject to Constraints } x_1 + x_2 \geq 2$$

$$4x_1 + x_2 \geq 4$$

$$x_1, x_2 \geq 0$$

(10 Marks)

Module-3

- 5 a. Obtain an Initial basic feasible solution to the transportation problem using North West corner rule and least cost method.

		Destination			
		D ₁	D ₂	D ₃	
Origin	O ₁	2	7	4	5
	O ₂	3	3	1	8
	O ₃	5	4	7	7
	O ₄	1	6	2	14
		8	8	18	

(06 Marks)

- b. There are 3 factories A, B, C supplying goods to four dealers D₁, D₂, D₃ and D₄. The production capacities and requirements are given in the table. The project in Rs. is also given. Determine the optimum solution to maximize the profits.

	D ₁	D ₂	D ₃	D ₄	Capacity
A	22	26	20	21	450
B	21	24	20	19	300
C	18	20	19	20	250
Requirement	200	300	150	270	

(14 Marks)

OR

- 6 a. A company has 3 plants at location A, B and C which supplies to warehouses located at D, E, F, G and H. Monthly plant capacities are 800, 500 and 900 units respectively. The monthly warehouse requirement are 400, 400, 500, 400 and 800 units respectively. Unit transportation cost is given below. Determine the optimum distribution such that the company minimizes the cost.

	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	6
C	8	4	6	6	4

(16 Marks)

- b. List any 4 applications of Transportation problems.

(04 Marks)

Module-4

- 7 a. State and explain the characteristics of queuing system. (06 Marks)
 b. Data of a project is given below :

Activity	Immediate Predecessor	Optimistic Time Hrs	Most likely Time Hrs	Pessimistic Time (Hrs)
A	-	4	6	8
B	-	1	4.5	5
C	A	3	3	3
D	A	4	5	6
E	A	0.5	1	1.5
F	B, C	3	4	5
G	B, C	1	1.5	5
H	E, F	5	6	7
I	E, F	2	5	8
J	D, H	2.5	2.75	4.5
K	G, I	3	5	7

- (i) Draw the network diagram.
 (ii) Find out the ES, EF, LS, LF and slack for each activity.
 (iii) Find out the variance and standard deviation for the critical path.
 (iv) Determine the probability of completing the project in 24 hours. (14 Marks)

OR

- 8 a. Define
 (i) Critical activity and critical path.
 (ii) Total float.
 (iii) Free float.
 (iv) AOA and AON diagram. (08 Marks)

- b. In a railway yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes.

Calculate the following :

- (i) The average number of trains in the queue.
 (ii) The probability that the queue size exceed 10.
 (iii) Expected waiting time in the queue.
 (iv) Average number of trains in the queue.
 (v) If the input of trains increase to an average 33 per day, what would be the changes in (i) and (ii) ? (12 Marks)

Module-5

- 9 a. Consider the following single machine sequencing

Job	J_1	J_2	J_3	J_4	J_5
Processing Time	14	8	6	4	16

Obtain

- (i) Optimal sequence by STP rule.
 (ii) Completion time of all the jobs.
 (iii) Mean flow time.
 (iv) Number of Tardy jobs if due date is 20 days. (08 Marks)

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- b. Obtain the optimal strategies for both persons and the value of the game for 2 person zero-sum game whose payoff matrix is as follows :

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

(12 Marks)

OR

- 10 a. Use graphical method to minimize the time needed to process the following jobs on the machines A B C D and E. For each machine find which jobs is to be loaded first. Calculate the total time required to process the jobs. The time given is in hours. The machining order for Job 1 is A B C D E and takes 3, 4, 2, 6, 2 hours respectively on the machines. The order of machines for Job 2 is B C A D E and takes 5, 4, 3, 2, 6 hours respectively for processing. (12 Marks)

- b. Solve the following game by using concept of dominance.

		Player B			
		B ₁	B ₂	B ₃	B ₄
Player A	A ₁	3	2	4	0
	A ₂	3	4	2	4
	A ₃	4	2	4	0
	A ₄	0	4	0	8

(08 Marks)

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Eighth Semester B.E. Degree Examination, Jan./Feb. 2023 Additive Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Briefly explain the process chain of additive manufacturing. (10 Marks)
- b. Distinguish between additive manufacturing and CNC machining. (10 Marks)

OR

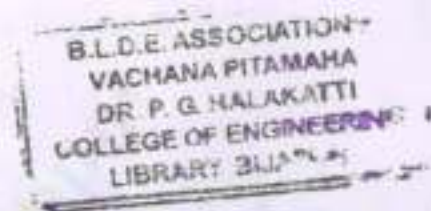
- 2 a. Sketch and explain solid sheet system process. (10 Marks)
- b. Discuss additive manufacturing applications. (10 Marks)

Module-2

- 3 a. With a neat sketch, explain DC compound motors. (10 Marks)
- b. Sketch and explain hydraulic piston motor. (10 Marks)

OR

- 4 Write note on following actuators:
 - i) Solenoids
 - ii) Relays
 - iii) Diodes
 - iv) Thyristors.



(20 Marks)

Module-3

- 5 a. List and explain polymers used in additive manufacturing process. (10 Marks)
- b. Explain dry spinning technique of polymer processing. (10 Marks)

OR

- 6 a. Explain mechanical methods of powder production systems. (10 Marks)
- b. Define sintering process and explain micro wave sintering process with neat sketch. (10 Marks)

Module-4

- 7 a. What are nano materials? Discuss challenges in nanotechnology. (10 Marks)
- b. Explain flame assisted ultrasonic spray pyrolysis. (10 Marks)

OR

- 8 a. Explain the working of scanning electron microscope with neat sketch. (10 Marks)
- b. Explain the working principles of atomic force microscopy. (10 Marks)

Module-5

- 9 a. Discuss classifications of CNC machine tools. (10 Marks)
- b. Explain different components of CNC machine tools. (10 Marks)

OR

- 10 a. Explain levels of automation with examples. (10 Marks)
- b. Write a note on continuous and discrete control. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Eighth Semester B.E. Degree Examination, Jan./Feb. 2023 Product Life Cycle Management

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define product life cycle management. Explain the product life cycle management model with a neat sketch. (10 Marks)
- b. Explain the need and benefits of product life cycle management. (10 Marks)

OR

- 2 a. What is strategy? Explain the impact of strategy on product life cycle management. (10 Marks)
- b. What is PDM (Product Data Management) System? Explain the basic components of a PDM system. (10 Marks)

Module-2

- 3 a. Discuss the role of concurrent engineering in product design and development. (10 Marks)
- b. What is design for X in product design? List the various techniques in design for X system. (10 Marks)

OR

- 4 a. Discuss the various steps involved in product design. (10 Marks)
- b. Explain clearly the concepts involved in organizing and decomposition in product design. (10 Marks)

Module-3

- 5 a. Define New Product Development (NPD) and discuss the need for NPD. (10 Marks)
- b. What is Decision Support System (DSS)? Discuss the components for building DSS. (10 Marks)

OR

- 6 a. Explain the different financial control technique involved in new product development. (10 Marks)
- b. Discuss the steps involved in product redesign. (10 Marks)

Module-4

- 7 a. Classify technology forecasting and briefly explain the different methods under each classification. (10 Marks)
- b. Discuss the various methodologies and tools in the product innovation process. (10 Marks)

OR

- 8 a. Write short notes on:
 - (i) Delphi technique
 - (ii) Scenario writing
 - (iii) Growth curve(12 Marks)
- b. Discuss the use of morphological analysis in technological forecasting. (08 Marks)

Module-5

- 9 a. Discuss the need and benefits of virtual product development. (10 Marks)
b. What is data model? Discuss the different types of data models stating their merits and demerits. (10 Marks)

OR

- 10 a. Discuss 3D CAD system and digital mockup in virtual product development. (10 Marks)
b. Discuss any two common techniques for analyzing virtual product models. (10 Marks)

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Fifth Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023
Management and Economics

Time: 3 hrs.

Max. Marks: 100

Note : 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Interest Factor table is permitted.

Module-1

- 1 a. Define Management and discuss its nature and characteristics. (06 Marks)
b. Discuss Fayol's principles of Administrative Management. (14 Marks)

OR

- 2 a. What is Planning? Explain different steps in Planning. (10 Marks)
b. What do you understand by term Planning Premises? Explain different types of Planning premises. (10 Marks)

Module-2

- 3 a. Briefly explain principles of Organisation. (10 Marks)
b. What is Recruitment? Explain sources of Recruitment. (10 Marks)

OR

- 4 a. List various Motivation theories. Explain Maslow need Hierarchy theory in brief. (10 Marks)
b. Explain requirements of a good control system. (10 Marks)

Module-3

- 5 a. Explain Laws of Supply and Demand using suitable sketch. (08 Marks)
b. With a neat sketch, explain Cash flow diagram. (04 Marks)
c. Determine the effective interest rate for nominal annual rate of 8% compounded.
i) Daily (Assume 365 days/yr) ii) Monthly iii) Quarterly iv) Semi-annually. (08 Marks)

OR

- 6 a. What is Law of Diminishing return? Write its limitations. (03 Marks)
b. Discuss terms : i) Price elasticity of demand ii) Income elasticity of demand. (08 Marks)
c. A person is planning for his retired life. He has 10 more years of service. He would like to deposit 20% of his salary, which is Rs 4000 in first year and thereafter he wishes to deposit amount with annual increase of Rs 500 for next nine years with an interest rate of 15%. What will be the maturity amount? (09 Marks)

Module-4

- 7 a. Following table gives initial outlay and annual revenue of a production firm using three various alternatives. Find the best alternative based on present worth if the rate of interest is 20% compounded annually. (09 Marks)

	Initial Outlay	Annual Revenue	Life (Years)
Alternative 1	13,00,000	4,00,000	10
Alternative 2	21,00,000	6,50,000	10
Alternative 3	23,00,000	8,60,000	10

- b. Find the most economical alternatives from following on the basis of equivalent future worth at interest rate of 9.5% per year.

Alternative I : Initial purchase cost = Rs 15,00,000 , Annual operating cost = Rs 35,000 starting from end of second year till end of life , Annual revenue generated = Rs 340000 for first 4 yrs then Rs 320000 afterwards till end of useful life. Expected salvage value is Rs 430000 and useful life = 8 yrs.

Alternative II : Initial purchase cost = Rs 1800000 , Annual operating cost = Rs 2500 , Annual revenue generated = Rs 365000 , Salvage value = Rs 550000 , Useful life = 8 yrs. (11 Marks)

OR

- 8 a. Explain IRR , ERR and MARR. Enlist the misconcepts of IRR. (08 Marks)
 b. A firm has identified three mutually exclusive investment proposals whose details are given below. The life of three investments is estimated to be five years with negligible salvage value. The minimum rate of return for the firm is 12%. Find the best alternative based on rate of return method of comparison. (12 Marks)

	Alternative		
	A ₁	A ₂	A ₃
Investment	1,50,000	2,10,000	2,55,000
Annual net income	45,570	58,260	69,000

Module-5

- 9 a. With a block diagram, explain how a selling price of a product is determined? (08 Marks)
 b. The expenditure incurred in manufacturing machine is as follows :
 1) Material consumed = Rs 55,00,000 2) Indirect factory wages = Rs 8,00,000
 3) Directors fees = Rs 3,00,000 4) Cost of advertisement = Rs 1,00,000
 5) Net profit = Rs 1,20,000 6) Depreciation on sales dept car = Rs 11,000
 7) Printing and stationery cost = Rs 2500 8) Depreciation of plant = Rs 45,000
 9) Direct wages = Rs 6,50,000 10) Factory rent = Rs 60,000
 11) Telephone and postage charges = Rs 15,000
 12) Gas and electricity = Rs 50,000 13) Office salaries = Rs 2,10,000
 14) Office rent = Rs 50,000 15) Show room rent = Rs 1,50,000
 16) Sales man commission = Rs 26,500 17) Sales dept car expensed = Rs 15,000
 Determine i) Direct cost ii) Factory cost iii) Total cost of production
 iv) Cost of sales v) Selling price. (12 Marks)

OR

- 10 a. What do you mean by Depreciation? Discuss various causes of depreciation. (10 Marks)
 b. A Company has purchased on equipment whose first cost is Rs 2,00,000 with an estimated life of eight years. Estimated salvage value is 40,000 at the end of its life. Determine the depreciation charges and book value at the end of second year by sum of year's digit method of depreciation. (10 Marks)

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Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Design of Machine Elements - I

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of design data handbook is permitted.

Module-1

- 1 a. Discuss the factors influencing the selection of suitable material for machine element. (08 Marks)
 b. Determine the safe load that can be carried by a bar of rectangular cross section shown in Fig.Q1(b). Limiting the maximum stress to 130 MPa taking stress concentration into account and assume thickness of bar as 10 mm.

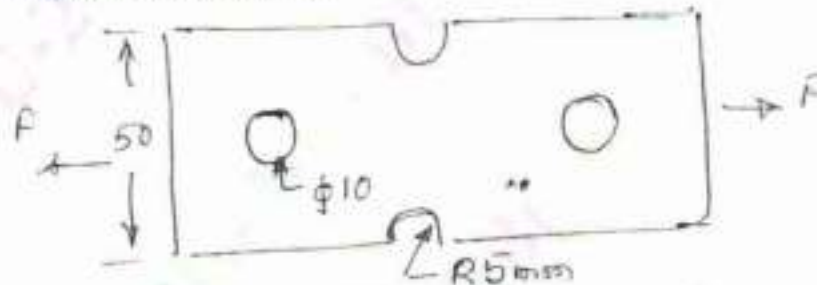


Fig.Q1(b)

(12 Marks)

OR

- 2 a. Explain the following theories of failure :
 (i) Maximum normal stress theory
 (ii) Maximum shear stress theory
 (iii) Distortion energy theory (10 Marks)
 b. A machine element made of C45 steel is subjected to a system of loads, following stresses are induced at critical point:
 $\sigma_x = 150 \text{ MPa}$, $\sigma_y = 100 \text{ MPa}$ and $\tau_{xy} = 50 \text{ MPa}$
 Find the factor of safety according to:
 (i) Maximum normal stress theory
 (ii) Maximum shear stress theory
 (iii) Distortion energy theory (10 Marks)

Module-2

- 3 a. Derive Soderberg's equation. (06 Marks)
 b. A hot rolled steel rod is subjected to torsional load that varies from +330 N-m clockwise to 110 N-m counter clockwise and an applied bending moment varies from +440 N-m to -220 N-m. The rod is of uniform cross section. Determine the required diameter rod. The material has an ultimate tensile strength of 550 MPa and yield strength of 410 MPa. Assume a factor of safety 1.5. Take the endurance limit as half of the ultimate strength. (14 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written e.g. 42+8 = 50, will be treated as malpractice.

OR

- 4 a. List and explain the various factors effecting the endurance limit of the material. (08 Marks)
- b. An unknown weight falls through 20 mm as to a collar rigidly attached to the lower end of a vertical bar 2 meter long and 500 mm^2 section. If the maximum instantaneous extension is 2 mm. What is the corresponding stress and the value of unknown weight? Take $E = 200 \text{ GPa}$. (06 Marks)
- c. A cantilever beam of span 800 mm has a rectangular cross section of depth 200 mm. The free end of beam is subjected to a transverse load of 1 kN that drops on to it from a height of 40 mm. Selecting C40 steel as material and a factor of safety 2. Determine the width of rectangular cross section. Assume $E = 200 \text{ GPa}$. (06 Marks)

Module-3

- 5 A commercial shaft 1 metre long supported between bearings has a pulley of 600 mm diameter weighing 1 kN, driven by a horizontal belt drive keyed to the shaft at a distance of 400 mm to the left of the right bearing and receives 25 KW at 1000 rpm. Power from the shaft is transmitted from the 20° spur pinion of a pitch circle diameter 200 mm which is mounted at 200 mm to the right of the left bearing to a gear such that tangential force on gear acts vertically upwards. Take the ratio of the belt tension is 3. Determine the standard size of the shaft based on maximum shear stress theory. Assume $C_m = 1.75$, $C_s = 1.25$. (20 Marks)

OR

- 6 a. Compare weight, strength and stiffness of hollow shaft of same external diameter of that solid shaft. The inside diameter being half the external diameter. Both the shafts have same material and length. (06 Marks)
- b. Design a cast iron flanged coupling for a steel shaft transmitting 100 KW at 250 rpm. Take the allowable shear stress for the shaft as 40 N/mm^2 . The angle of twist is not to exceed 1° in a length of 20 diameters. Allowable shear stress for the bolts is 13 MPa. The allowable shear stress in the flange is 14 MPa for the key is 40 MPa. Allowable compressive stress in key is 80 MPa. (14 Marks)

Module-4

- 7 a. Explain in detail various possible modes of failure of riveted joint. (06 Marks)
- b. Design a double riveted butt joint with two equal cover plates for the longitudinal seam of a boiler shell 1.5 m in diameter subjected to a steam pressure of 0.95 N/mm^2 . Assume an efficiency of 75% allowable tensile stress in the plate of 90 N/mm^2 , allowable crushing stress of 140 N/mm^2 and an allowable shear stress in the rivet of 50 N/mm^2 . (14 Marks)

OR

- 8 a. A bracket having a load of 15 kN is to be welded as shown in Fig.Q8(a). Find the size of weld required, if allowable shear stress is not to exceed 80 N/mm^2 .

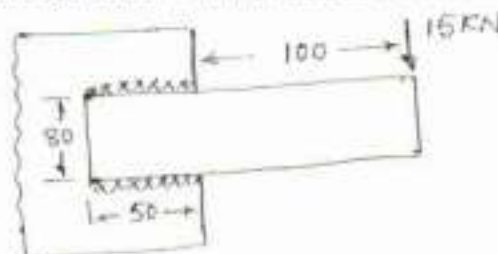


Fig.Q8(a)

(10 Marks)

- b. Determine the size of rivets required for the bracket shown in Fig.Q8(b). Take allowable shear stress of rivet material as 100 N/mm^2 .

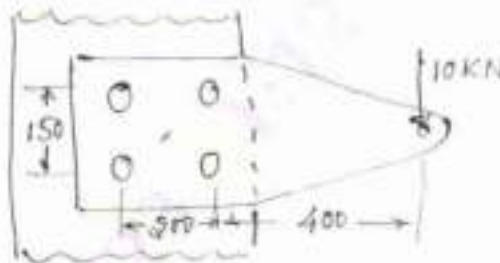


Fig.Q8(b)

(10 Marks)

Module-5

- 9 a. Obtain an expression for torque required to lift the load on a square threaded screw. (08 Marks)
- b. Design a socket and Spigot type cotter joint to sustain an axial load of 100 kN. The material selected for the joint has the following design stresses $\sigma_t = 100 \text{ N/mm}^2$, $\sigma_c = 150 \text{ N/mm}^2$ and $\tau = 60 \text{ N/mm}^2$. (12 Marks)

OR

- 10 a. Explain self locking and overhauling of power screw. (06 Marks)
- b. The cotter of a broaching machine is pulled by square threaded screw of 55 mm external diameter and 10 mm pitch. The operating nut takes the axial load of 400 N. On a flat surface of 60 mm and 90 mm internal and external diameters respectively. If the coefficient of friction is 0.15 for all contact surfaces, determine the power required to rotate the nut when the cutting speed is 6 m/min. Also find the efficiency of the screw. (14 Marks)

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Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Dynamics of Machines

Time: 3 hrs.

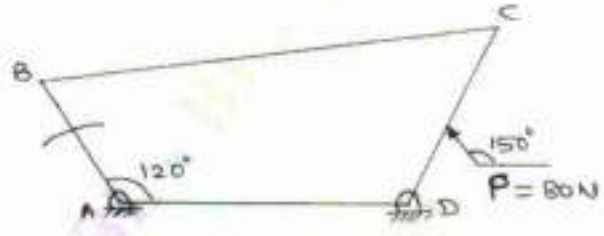
Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 A four bar mechanism with the following dimensions is acted upon by a force 80N, 150° on the link DC. Determine the input torque on the link AB for the static equilibrium of the mechanism for the given configuration Fig. Q1. $AB = 400\text{mm}$, $BC = 1000\text{mm}$, $CD = 750\text{mm}$ and $DE = 350\text{mm}$, $AD = 500\text{mm}$. (20 Marks)

Fig. Q1



OR

- 2 a. State the condition of equilibrium of a body subjected to a system of
 i) Two force ii) Three force iii) Two force and a torque. (06 Marks)
 b. In a vertical engine, the length of connecting rod is 4.5 times the crank. The mass of reciprocating parts is 120kg and the crank length is 220mm. The engine runs at 250 rpm. The load on the piston due to steam pressure is 25 kN, when the crank has turned through an angle of 120° from the top dead centre. Determine i) Net effective driving force on the piston ii) Thrust on connecting rod iii) Thrust on the bearings iv) Turning moment on the crank shaft. (14 Marks)

Module-2

- 3 a. Explain Static and Dynamic balancing of rotating masses. (04 Marks)
 b. Four masses A, B, C and D carried on a shaft at radii 100mm, 125mm, 200mm and 150mm respectively. The planes at which masses are rotating are placed 600mm apart. The mass B, C and D are 10kg, 5kg and 4kg respectively. Find the mass of A and relative angular position of the four masses so that the shaft will be in equilibrium. (16 Marks)

OR

- 4 The firing order in a six cylinder four stroke in line engine is 1 - 4 - 2 - 6 - 3 - 5. The piston stroke is 100mm and length of each connecting rod is 200mm. The pitch of the cylinder centre lines are 100mm, 100mm, 150mm, 100mm and 100mm respectively. The reciprocating mass per cylinder is 1kg and the engine runs at 3000 rpm. Determine the unbalanced primary and secondary forces and couples, if any. Take central plane of the engine as reference plane. (20 Marks)

Module-3

- 5 a. Derive the expression for speed of a Porter Governor with usual notations, taking friction into account. (08 Marks)

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- b. The upper arms of a Porter Governor has lengths 350mm and are pivoted on the axis of rotation. The lower arms have lengths 300mm and are attached to the sleeve at a distance of 40mm from the axis. Each ball has a mass of 4 kg and mass on the sleeve is 45kg. Determine the equilibrium speed for a radius of rotation of 200mm and find the effort and power of governor for 1% speed change. (12 Marks)

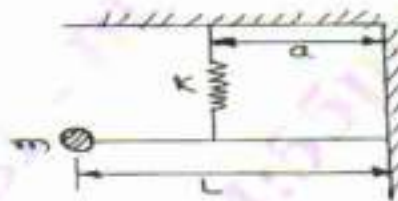
OR

- 6 a. Explain the effect of gyroscopic couple on an Aeroplane. (06 Marks)
 b. The turbine rotor of a ship has a mass of 3500kg. It has a radius of gyration of 0.45m and a speed of 3000 rpm clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship.
 i) When the ship is steering to the left on a curve of 100m radius at a speed of 36km/hour.
 ii) When the ship is pitching with SHM the bow falling with its maximum velocity. The period of pitching is 40 sec and the total angular displacement between the two extreme position of pitching is 12° . (14 Marks)

Module-4

- 7 a. Define the following with respect to vibration : i) Degrees of freedom ii) Amplitude
 iii) Resonance iv) Natural frequency v) Damping factor. (10 Marks)
 b. Determine the natural frequency of the system shown in Fig. Q7(b) by Newton's and Energy method. (10 Marks)

Fig. Q7(b)



OR

- 8 a. Set up the differential equation for a spring mass damper system and obtain complete solution for the critically damped condition. (10 Marks)
 b. A vibrating system having a mass of 3kg, spring stiffness of 100 N/mm and damping coefficient of 3 N-S/m. Determine damping ratio, damped natural frequency, logarithmic decrement, ratio of two consecutive amplitudes and number of cycles after which the original amplitude is reduced to 20%. (10 Marks)

Module-5

- 9 a. Define "Transmissibility". Derive an expression for force transmissibility. (10 Marks)
 b. A 35kg block is connected to a support through a spring of stiffness 1.4×10^6 N/m in parallel with dashpot of damping coefficient 1.8×10^3 N-S/m. The support is given a harmonic displacement of amplitude 10mm at a frequency of 35Hz. Compute the steady state amplitude of the absolute displacement of the block. (10 Marks)

OR

- 10 a. Derive an equation for steady state amplitude for forced vibration with rotating unbalance. (10 Marks)
 b. A rotor has a mass of 12kg and is mounted midway on a 24mm diameter horizontal shaft supported simply at the ends by two bearings. The bearings are 1m apart. The shaft rotates at 2400 rpm. If the centre of mass of the rotor is 0.1mm away from the geometric centre of the rotor due to manufacturing defect, find i) the amplitude of the steady state vibration ii) the dynamic force transmitted to the bearing. Take $E = 200$ GPa. (10 Marks)

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Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Turbomachines

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. Define specific speed of a turbine. Derive an expression for specific speed of a turbine. (08 Marks)
- b. A model of a centrifugal pump absorbs 5kW at a speed of 1500rpm. Pumping water against a head of 6m. The large prototype pump is required to pump water to a head of 30m. The scale ratio of diameter is 4. Assuming some efficiency and similarities, find the speed, power of prototype and ratio of discharge of prototype and model. (08 Marks)
- c. For power generating turbomachines, define
 - i) Total – to – total efficiency
 - ii) Total – to – static efficiency. (04 Marks)

OR

2. a. With usual notations, derive an expression for infinitesimal stage efficiency during compression process with an aid of T-S plot. (08 Marks)
- b. An air compressor has eight stages of equal pressure ratio 1.3. The flow rate through the compressor and its overall efficiency are 45Kg/s and 80% respectively. If the conditions of air at entry are 1 bar and 35°C, determine,
 - i) State of air at compressor exit
 - ii) Polytropic efficiency (06 Marks)
- c. Compare the turbomachine with positive displacement machines. (06 Marks)

Module-2

3. a. Derive alternate form of Euler's turbine equation and explain the significance of each energy component. (10 Marks)
- b. At a stage of an axial flow impulse turbine, the mean blade diameter is 80cm and the speed is 3000 rpm. The absolute velocity of the fluid at inlet is 300m/sec and is inclined at 20° to the plane of the wheel. If the utilization factor is 0.85 and the relative velocity at rotor exit is equal to that at inlet, determine
 - i) Inlet and exit blade angles
 - ii) Power output for a mass flow rate of 1Kg/sec. (10 Marks)

OR

4. a. Define degree of reaction for an axial flow machine. Prove that degree of reaction for an axial flow device assuming constant velocity of flow is given by

$$R = \frac{V_a}{2u} [\cot\beta_1 + \cot\beta_2] \quad (10 \text{ Marks})$$
- b. In a turbine stage with 50% reaction the tangential blade speed is 98.5 m/sec. The steam velocity at the nozzle exit is 155 m/sec and the nozzle angle is 18°. Assuming symmetric inlet and outlet velocity triangles. Compute the inlet blade angle for the rotor and power developed by the stage assuming a steam flow rate of 10Kg/sec. Also find the utilization factor. (10 Marks)

Module-3

- 5 a. Draw the inlet and exit velocity triangle for a single stage impulse steam turbine and prove that maximum blade efficiency is given by

$$\eta_{\text{max}} = \cos^2 \alpha_1$$
 Assume $v_{u1} = v_{u2}$ and $\beta_1 = \beta_2$. (10 Marks)
- b. The following particulars refer to a stage of a Parson's steam turbine. The mean diameter of the blade ring is 70cm, the steam velocity at the inlet of moving blades is 160m/sec, the outer blade angle of moving blade β_2 is 20° . The steam flow through the blades is 7Kg/sec, Speed 1500rpm and η_{st} is 0.8. Draw the velocity diagrams and find the following :
 i) Blade inlet angle
 ii) Power developed in the stage
 iii) Available isentropic enthalpy drop. (10 Marks)

OR

- 6 a. Define and explain nozzle efficiency and stage efficiency. (04 Marks)
 b. With a neat sketch, explain the velocity compounding. (06 Marks)
 c. In a stage of an impulse turbine provided with single row wheel, the mean diameters of the blade ring is 80cm and the speed of rotation is 3000rpm. The steam issues from the nozzle with a velocity of 300m/sec and the nozzle angle is 20° . The rotor blades are equiangular and blade velocity coefficient is 0.85. What is the power developed in the blades when the axial thrust on the blade is 140N? (10 Marks)

Module-4

- 7 a. Derive an expression for force, power and efficiency of a Pelton turbine assuming no frictional losses with the help of velocity triangles. (10 Marks)
 b. The following data is given for a Francis turbine net head = 70m, Speed = 600rpm, Shaft power = 368kW, $\eta_{H1} = 86\%$, $\eta_{H2} = 95\%$, flow ratio = 0.25, breadth ratio = 0.12, outer diameter of runner = 2 times inner diameter of runner, velocity of flow is constant at inlet and outlet, the thickness of vanes occupies 10% of the circumferential area of the runner and discharge is radial at outlet. Determine :
 i) Guide blade angle
 ii) Runner vane angles at inlet and outlet
 iii) Diameters of runner at inlet and outlet
 iv) Width of the wheel at inlet (10 Marks)

OR

- 8 a. Draw the cross sectional views of a Kaplan turbine and explain its working with a neat sketches of velocity triangles at inlet and outlet of Kaplan turbine runner. (10 Marks)
 b. A three - jet Pelton wheel is required to generate 10,000kW under a head of 400m. The blade angle at outlet is 15° and reduction in relative velocity over the bucket is 5%. If the overall efficiency is 80%, $C_v = 0.98$ and speed ratio = 0.46. Find
 i) Diameter of jet
 ii) Total flow in m^3/sec
 iii) Force exerted by a jet on the buckets (10 Marks)

Module-5

- 9 a. Applying Bernoulli's equation between the inlet and exit of the impeller of a centrifugal pump. Show that the static pressure rise is given by,
 $(P_2 - P_1) = \rho/2 [vf_1^2 + u_2^2 - vf_2^2 \cos^2 \beta_2]$
 Where, vf_1 = Velocity of flow at inlet
 vf_2 = Velocity of flow at exit
 β_2 = Blade angle at exit
 u_2 = Blade speed at exit
 ρ = density of fluid (08 Marks)
- P_1 and P_2 = Static pressure at inlet and exit
- b. The outer diameter of the impeller of a centrifugal pump is 40cm and width of the impeller at outlet is 5cm. The pump is running at 800rpm and is working against a total head of 15m. the vane angle at outlet is 40° and manometric efficiency is 75%. Determine :
 i) Velocity of flow at outlet
 ii) Velocity of water leaving the vane
 iii) Angle made by the absolute velocity at outlet with the direction of motion at outlet (08 Marks)
 iv) Discharge (04 Marks)
- c. Explain the phenomenon of surging in compressor.

OR

- 10 a. Define the following for a centrifugal compressor
 i) Slip and slip coefficient
 ii) Energy transfer
 iii) Power input factor
 iv) Overall pressure ratio
 v) Loading coefficient (10 Marks)
- b. A 4 -stage centrifugal pump has impellers each of 38cms diameter and 1.9cms wide at outlet. The outlet vane angle is 49° and vanes occupy 8% of the outlet area. The manometric efficiency is 84% and overall efficiency is 75%. Determine the head generated by the pump when running at 900rpm discharging 59 litres/second. Also determine the power required. (10 Marks)

CBCS SCHEME

B.L.D.E. ASSOCIATION'S
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Question Paper Version : B

Fifth Semester B.E Degree Examination, Jan./Feb. 2023

Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **hundred** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

1. The Karnataka State Pollution Control Board (KSPCB) was established in the year.
a) 1974 b) 1982 c) 1973 d) 1983
2. Which of the following is not a part of the hydrological cycle?
a) Precipitation b) Infiltration
c) Transpiration d) Perspiration
3. First International Earth Summit was hold at
a) USA b) Russia
c) Rio-de-Janerio d) Johannesburg
4. Which among the following has highest percentage of calorific value?
a) Anthracite b) Peat
c) Lignite d) Bituminous coal
5. Nitrogen fixing bacteria exists in
a) Leaf b) Stem
c) Roots d) Flower
6. The two major components of ecosystem are
a) Adiabatic and isotropic b) Ecologic and climatologic
c) Cyclic and biologic d) Abiotic and biotic
7. Geothermal energy is a
a) Heat energy b) Wind energy
c) Current energy d) Solar energy



8. The average life expectancy around the world is currently.
- a) Decreasing
 - b) Increasing
 - c) Stabilizing
 - d) Not changing
9. The universal declaration of Human Rights was proclaimed by the UN in the year.
- a) 1946
 - b) 1947
 - c) 1948
 - d) 1949
10. The objective of Integrated Child Development Service (ICDS) are
- a) Immunization
 - b) Health check up and referral services
 - c) Pre-school non formal education
 - d) All of these
11. GIS stands for
- a) Geostationary Interact Sector
 - b) Geographical Information System
 - c) Geotechnical Information Society
 - d) Geothermal Investigation Site
12. LPG is a mixture of
- a) N_2 and H_2S
 - b) CO_2 and N_2
 - c) Propane and butanes
 - d) Methane and CO_2
13. The Tiger Conservation Project was started in
- a) 1973
 - b) 1975
 - c) 1981
 - d) 2000
14. The leader of "Chipko Movement" is
- a) Sunderlal Bahuguna
 - b) Medha Patkar
 - c) Vandana Shiva
 - d) Mahatma Gandhi
15. Which of the following is the source of Fly-ash?
- a) Vehicular exhaust
 - b) Sewage
 - c) Thermal power plant
 - d) All of these
16. The permissible range of pH for drinking water as per the Indian Standard is
- a) 6 to 9
 - b) 6.5 to 8.5
 - c) 6 to 8.5
 - d) 6.5 to 7.5
17. Water logging is a phenomena in which
- a) Water patterns are rotated
 - b) Soil root zone becomes saturated due to over irrigation
 - c) Erosion of soil
 - d) Soil degradation
18. Carbon content is higher in
- a) Living matter
 - b) Soil
 - c) Water
 - d) Atmosphere
19. Springs means
- a) Surface water
 - b) Atmosphere water
 - c) Both (a) and (b)
 - d) Ground water
20. Bio-remediation means deliberately introducing micro organisms to break pollutants.
- a) Soil
 - b) Waste water
 - c) Ground water
 - d) Both soil and groundwater

21. In geosynchronous orbit altitude of the satellite is about
a) 36,000 kms
b) 10,000 kms
c) 50,000 kms
d) None of these
22. The Air (Prevention and Control of Pollution) Act was enacted in the year.
a) 1987
b) 1981
c) 1991
d) 1988
23. Kudremukh Iron ore mine, Karnataka was closed due to
a) River pollution and threat to biodiversity
b) Land encroachment
c) Radioactive hazards
d) Serious health hazard
24. On the eve of Gandhi Jayanthi which andolan was launched by our Honorable Prime Minister
a) Swadeshi
b) Sarvashikshana Abhiyana
c) Suvarnagrama
d) Swach Bharath
25. An international agreement signed in the year 1987, to protect stratospheric ozone is known as
a) Montreal protocol
b) Kyoto protocol
c) Earth summit
d) None of these
26. The explosion of First Atomic Bomb was done in Hiroshima and Nagasaki in
a) 1946
b) 1986
c) 1945
d) 1947
27. A dangerous pesticide which has been reported to cause physical deformities to people of Kerala and Karnataka states
a) Endosulfan
b) Fluorides
c) DDT
d) Dioxygene
28. Visible portion of EMR ranges between
a) $0.4 - 0.76 \mu\text{m}$
b) $10.5 - 12.5 \mu\text{m}$
c) $8.0 - 14.0 \mu\text{m}$
d) None of these
29. Data representation in Raster data is by
a) pixel
b) points, lines and polygon
c) latitude and longitude
d) none of these
30. In water treatment, alum is used for
a) softening
b) coagulation
c) filtration
d) disinfection
31. Among the fresh water available in the earth the percentage of surface water is about
a) 50%
b) 10%
c) 5%
d) less than 1%
32. Hepatitis is caused by
a) Protozoa
b) Virus
c) Bacteria
d) Fungus
33. In India groundwater resources are rich in
a) Plains of river Kaveri and Krishna
b) The Deccan plateau
c) The Gangetic plains
d) The plains of Netravati and Kapila
34. The required iron content in drinking water as specified by BIS is
a) 300 mg/l
b) 30 mg/l
c) 3 mg/l
d) 0.30 mg/l

35. Molasses from sugar industry is used to generate
 a) Biodiesel
 b) Hydrogen
 c) Bioethanol
 d) Biomethanol
36. Wind Farms are located in
 a) River basin
 b) Plain area
 c) Hilly area
 d) Valley area
37. Biomass consists of
 a) Lignin
 b) Hemi cellulose
 c) Cellulose
 d) All of these
38. Natural gas contains
 a) Carbon dioxide
 b) Hydrogen
 c) Methane
 d) Nitrogen
39. Anti tobacco day is mentioned on
 a) 31st May
 b) 30th June
 c) 31st July
 d) 31st August
40. Population explosion will cause
 a) Socio-Economic Problems
 b) Food Scarcity
 c) Energy crises
 d) All of these
41. Which of the following element make e-waste hazardous in nature?
 a) Land
 b) Glass
 c) Plastic
 d) Iron
42. What is the hazardous pollutant released from batteries?
 a) Arsenic
 b) Barium
 c) Cobalt
 d) Cadmium
43. What is the term used for reuse of sewage sludge?
 a) Compost
 b) Solids
 c) Biosolids
 d) Sludge
44. Reduction in brightness of the famous Taj Mahal is due to
 a) Global warming
 b) Air pollution
 c) Ozone depletion
 d) Afforestation
45. E.I.A. can be expanded as
 a) Environment and Industrial Act
 b) Environment of Impact Activities
 c) Environmental Impact Assessment
 d) Environmentally Important Activity
46. Organic Farming is
 a) Farming without using pesticides and chemical fertilizer
 b) Enhances biodiversity
 c) Promotes soil biological activity
 d) All of these
47. Bio-remediation means the removal of contaminants from
 a) Soil
 b) Wastewater
 c) Groundwater
 d) Both soil and ground water

48. Plants use _____ gas for photosynthesis.
 a) Oxygen
 b) Methane
 c) Nitrogen
 d) Carbon dioxide
49. What is the maximum allowable concentration of fluorides in drinking water?
 a) 1.0 mg/l
 b) 1.25 mg/l
 c) 1.50 mg/l
 d) 1.75 mg/l
50. Forest rich area in Karnataka is found in _____.
 a) Western Ghats
 b) Bandipur
 c) Nagarhole
 d) Mangalore
51. "Minamata Disease" is caused due to
 a) Lead
 b) Arsenic
 c) Mercury
 d) Cadmium
52. Alternative eco-friendly fuel for automobiles is
 a) Petrol
 b) Diesel
 c) CNG
 d) Kerosene
53. Population explosion will cause
 a) Biodiversity
 b) Stress on ecosystem
 c) More employment
 d) None of these
54. Which of the following is having high population density?
 a) India
 b) China
 c) USA
 d) Western Europe
55. Demography is the study of
 a) Animals behaviour
 b) Population growth
 c) River
 d) None of these
56. Forest are called as _____.
 a) Air purifier
 b) Earth's lungs
 c) Oxygen reservoir
 d) CO₂ absorbers
57. Which of the following is the facility that the urban people enjoy?
 a) Better quality of air
 b) Better communication access
 c) Large land at cheap rates
 d) None of these
58. Which of the following is an air pollutant?
 a) Carbon dioxide
 b) Oxygen
 c) Nitrogen
 d) Particulate matter
59. Cyto toxic and expired drugs are disposed of by
 a) damping
 b) autoclave
 c) incineration
 d) chemical disinfection
60. The colour code of plastic bag for disposing of microbial laboratory culture waste.
 a) Black
 b) Red
 c) Blue
 d) White
61. South Africa is leading exporter of which mineral?
 a) Copper
 b) Diamond
 c) Silver
 d) Gold

62. The word 'sustainable development' came into existence in the year.
 a) 1992 b) 1978 c) 1980 d) 1987
63. The other word of landscaping is
 a) Reduction b) Restoration
 c) Removing topsoil d) Restore
64. Cloud seeding with silver iodide is based on the
 a) Bergeron process b) Collision-coalescence process
 c) Both a and b d) None of these
65. Environmental pollution is due to
 a) Rapid urbanization b) Deforestation
 c) Afforestation d) a and b
66. The liquid waste from bathroom and kitchen is called
 a) Sullage b) Domestic sewage
 c) Storm water d) Runoff
67. BOD means
 a) Biochemical Oxygen Demand b) Chemical oxygen demand
 c) Biophysical Oxygen Demand d) All of these
68. Which of the following source is surface water?
 a) Springs b) Streams
 c) Deep wells d) All of these
69. Which of the following is biodegradable?
 a) Plastics b) Domestic sewage
 c) Detergents d) a and c
70. Blaring sounds known to cause
 a) Mental distress b) High cholesterol
 c) Neurological problems d) All of these
71. Eutrophication is
 a) an improved quality of water in lakes
 b) a process in carbon cycle
 c) the result to accumulation of plant nutrients in water bodies
 d) a water purification technique
72. Primary consumer is
 a) Herbivores b) Carnivores
 c) Macro consumers d) Omnivores
73. Which among the following is a climatic factor?
 a) pressure b) humidity
 c) temperature d) all of these
74. Biodiversity can be broadly classified into how many types?
 a) 2 b) 5 c) 3 d) 4

75. Hot spot areas have
 a) Low density of biodiversity
 b) Only endangered plants
 c) High density of hot springs
 d) High density of biodiversity
76. About _____ % of the earth's surface is covered by water.
 a) 53% b) 19% c) 71% d) 90%
77. Deforestation means
 a) preservation of forests
 b) destruction of forests
 c) monocrop cultivation
 d) agriculture
78. When did National Disaster Management Authority formed?
 a) 2000 b) 2005 c) 2010 d) 2015
79. Disaster is an event arising out of
 a) result of hazard event
 b) causes of hazard event
 c) causes of disaster event
 d) all of these
80. The scientific study of earthquake is called
 a) seismograph
 b) seismology
 c) both a and b
 d) none of these
81. World Environmental day is held every year on
 a) June 5th b) October 2nd c) April 22nd d) November 1st
82. Ozone layer thickness is measured in _____
 a) mm b) cm c) Dobson unit d) Db
83. First of the major environmental protection acts to be promulgated in India was
 a) The Water Act
 b) The Air Act
 c) The Environment Act
 d) Noise Pollution Rules
84. Blue baby syndrome is caused due to _____
 a) Manganese b) Ozone c) Silver d) Nitrate
85. World Earth's day is annually celebrated on
 a) April 22nd b) June 5th c) January 1st d) May 1st
86. The most important fuel used by nuclear power plant is
 a) U-235 b) U-238 c) U-245 d) U-248
87. Which of the following is a biotic component of ecosystem?
 a) Fungi
 b) Solar light
 c) Temperature
 d) Humidity
88. Abiotic component includes
 a) Soil
 b) Temperature
 c) Water
 d) All of these
89. The word "Environment" is derived from
 a) Greek
 b) French
 c) Spanish
 d) English

CBCS SCHEME

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18ME55

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Fluid Power Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a block diagram, explain hydraulic system. (07 Marks)
b. Give the differences between hydraulic system and pneumatic system. (07 Marks)
c. Explain Pascal's law. (06 Marks)

OR

- 2 a. With the help of sketch explain filter position in a hydraulic system. (07 Marks)
b. With a neat sketch, explain water cooled heat exchanger. (07 Marks)
c. Write a note on Seals. (06 Marks)

Module-2

- 3 a. With a neat sketch, explain internal gear pump. (07 Marks)
b. A pump having a displacement volume of 90cm^3 delivers $0.082\text{m}^3/\text{min}$ at 1000rpm and 6.9MPa . If the input torque is 102Nm . Find
i) Overall efficiency of the pump
ii) Theoretical torque required to operate the pump (07 Marks)
c. With a neat sketch, explain diaphragm type gas loaded accumulator. (06 Marks)

OR

- 4 a. With a neat sketch, explain hydraulic cylinder cushioning. (07 Marks)
b. A hydraulic motor has a 100cm^3 volumetric displacement. If it has a pressure rating of 140bars receives oil from a $0.001\text{m}^3/\text{s}$ theoretical flow rate pump, find motor
i) Speed
ii) Theoretical torque
iii) Theoretical power (08 Marks)
c. With a neat sketch, explain rotary actuator. (05 Marks)

Module-3

- 5 a. With a sketch, explain 3 position 4 way direction control valve. (08 Marks)
b. Explain working of unloading valve (07 Marks)
c. Explain working of shuttle valve. (05 Marks)

OR

- 6 a. With the help of circuit diagram, explain sequencing of cylinder. (08 Marks)
b. Explain metering in and metering out circuits. (12 Marks)

Module-4

- 7 a. List the advantages, disadvantages and applications of Pneumatic system. (08 Marks)
b. With a neat sketch, explain F.R.L unit in a pneumatic system. (12 Marks)

OR

- 8 a. With a neat labelled sketch explain parts of pneumatic double acting cylinder. (07 Marks)
b. With a neat sketch, explain quick exhaust valve. (07 Marks)
c. Explain working of reciprocating air compressor. (06 Marks)

Module-5

- 9 a. With circuit diagram, explain indirect control of single acting cylinders. (08 Marks)
b. Explain 'OR' and 'AND' logic gates. (08 Marks)
c. Write a note on pneumatic throttle valve. (04 Marks)

OR

- 10 a. Explain with circuit coordinated cylinder movements. (10 Marks)
b. With a neat sketch, explain solenoid controlled direction control valve. Mention advantages. (10 Marks)

CBGS SCHEME

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18ME56

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Operations Management

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Operation Management. Explain in brief the functions of operations managements. (10 Marks)
b. Define Productivity. Explain the factors affecting productivity. (10 Marks)

OR

- 2 a. A glass firm developing a substantial back log of orders is considering three courses of action

- i) Arrange for sub contracting
ii) Begin overtime production construct new facilities

The correct choice depends largely on future demand, which may be low, medium (or) high. By consensus, management ranks the respective probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals the effect on profits as shown below :

Course of action	Profit (in thousand R) if the demand is		
	Low (P = 0.1)	Medium (P = 0.5)	High (P = 0.4)
A. Arrange for sub-constructing	10	50	50
B-Begin over time	-20	60	100
C-construct new facilities	-150	20	200

- b. Explain break-even analysis with necessary equations, graph and assumptions. (08 Marks)

Module-2

- 3 a. A company adopts method of least squares to develop a linear trend equation for the data as shown in the table below :

Year (X)	1	2	3	4	5	6	7	8	9	10	11
Shipment in tons (Y)	2	3	5	10	8	7	12	14	14	18	19

Calculate the trend forecast for the year 12 and 20. (12 Marks)

- b. Explain the following forecasting methods :
i) Exponential smoothing
ii) Linear Regression (08 Marks)

OR

- 4 a. What is forecasting? List the steps involved in forecasting process. (10 Marks)
b. A firm use simple exponential smoothing with $\alpha = 0.1$ to forecast demand. The forecast for the week of February 1 was 500 units, where as actual demand turned out to be 450 units.
i) Forecast the demand for the week of February 8
ii) Assume that the actual demand during the week of the February 8 turned out to be 505units. Forecast the demand for the week of February 15. Continue on forecasting through March 15, assuming the sub sequent demands were actually 516, 488, 467, 554 and 510 units. (10 Marks)

Module-3

- 5 a. Explain the various factors that influence the location of plants. (10 Marks)
 b. Define the following :
 i) Design capacity
 ii) System capacity
 iii) Capacity planning
 iv) Facility layout (10 Marks)

OR

- 6 a. Sketch and explain any two types of layouts. (10 Marks)
 b. What is facility layout? What factors determines the types of layout used in an organization. (10 Marks)

Module-4

- 7 a. Define aggregate planning and master scheduling. Explain the pure strategies used for aggregate planning in brief. (10 Marks)
 b. List the common strategies used in aggregate planning. Explain any two. (10 Marks)

OR

- 8 a. What are the objectives and importance of aggregate planning? (10 Marks)
 b. Briefly explain the following with the help of a flow chart.
 i) Aggregate planning
 ii) Master scheduling (10 Marks)

Module-5

- 9 a. What are the benefits and limitation of MRP? (10 Marks)
 b. State the importance of purchasing and supply management. (10 Marks)

OR

- 10 a. Briefly explain the following :
 i) Vendor Development
 ii) E-procurement
 iii) Concept of tenders
 iv) The procurement process (10 Marks)
 b. Write a note on make or buy decision. (10 Marks)
