prod - 1.1.2 / 1.2.1.1 / 1.1.3.1

prodn

chapter - 1.12

1.2.1.1

1.1.3.1 -

DEPARTMENT OF PRODUCTION ENGINEERING

GOVERNMENT COLLEGE OF TECHNOLOGY

(AFFILIATED TO ANNA UNIVERSITY – CHENNAI)

COIMBATORE – 641013, TAMILNADU.

Phone: 0422-2432221 **Fax: 0422-2433355**

MINUTES OF THE MEETING OF BOARD OF STUDIES (BOS) 2013 – 2014

The Meeting of the Board of Studies in Production Engineering was held on **28.06.2013** (Friday) at 12.00 noon in the Production Engineering Department of Government College of Technology, Coimbatore. The following members were present in the meeting.

CHAIRMAN

1.	Head of the Department (Chairman)	:	Prof. V.Sritharan Associate Professor in Mechanical Engg.

MEMBERS

2.	All Professors	:	NIL
3.	All Associate Professors	:	Prof. S.Srinivasamoorthy
4.	All Assistant Professors with 5 years' service in the department	:	Prof. S.Gopi
5.	All Assistant Professors in the department	:	1. Prof. A.Sasikumar 2. Prof. G.Vijaya raja ragavan 3. Prof. N.Ajaymanikandan 4. Prof. S.Kumar 5. Prof. P.Ilamathi 6. Prof. M.Sankar kumar
6.	University Nominee (One)	:	Dr. Sakthivel, Associate Professor, Department of Mechanical Engineering, Anna University, Coimbatore. Mb. No.:9942912787
7.	Outside Experts in the subject to be nominated by Chairman of the Academic Council	:	1. Dr. G. Sundararaj, Associate Professor of Mech. Engg., P.S.G. College of Tech., Coimbatore - 641004 Mb. No.: 9443063367 Email: gsr@mec.psgtech.ac.in.

2. Dr. G.Ganesan,
Associate Professor,
Department of Mech. Engg.,
Karunya University,
Coimbatore,
Mb. No.: 9442014933
E-mail: ganesang_em@karunya.edu

8. Two Experts from the Industry to be nominated by the Academic Council : 1. Er. B.Sundararajan,
Execute Director,
K6 Alloys Pvt.Ltd,
372/1B,Palladam road,
Pappumpatty,
Coimbatore-641016,
Mb. No.: 9344837181,
E-mail: sundar@k6technology.com

2. Er. A.Narayanaswami,
Vice President –Manufacturing,
Roots Industries,
Coimbatore,
Mb. No.: 9791330508

The Chairman of BOS Prof. V.Sritharan, Professor of Production engineering (i/c) welcomed the members and gave a brief overview on the agenda to be discussed in this meeting

In the meeting, the members suggested to include the following industry based electives in the list of electives to be offered to pre-final and final year students.

1. Investment Casting
2. Design, Manufacture and Inspection of Gears
3. Design, Manufacture and Testing of Pumps

To handle the above subjects the members suggested to invite industrial experts from the following industries.

1. M/S. K6 Alloys Pvt. Ltd, Coimbatore.
2. M/S. Alpha Drives Pvt. Ltd., Coimbatore.
3. M/S. Best Engineers Pump Pvt. Ltd.

The syllabus prepared in consultation with industrial experts for each industry elective subject was discussed in detail and the corrections suggested by the members have been incorporated in the syllabus.

The following suggestions were given by the members

1. List of elective subjects may be made common for sixth, seventh and eighth semesters so that the students will have more flexibility in choosing the elective subject in a particular semester.
2. Three industry based elective subjects may be offered to full time B.E. Production Engineering students in addition to the existing elective subjects.

Finally the board approved the syllabus for the industrial electives for B.E. Full Time Production Engineering Branch.

The Chairman (BOS) thanked the members present and the meeting came to close at 2.00 PM

8/7/13

CHAIRMAN (BOS – Production Engg.)

Copy to:

1. The Principal
2. The Controller of Examinations, GCT, Coimbatore
3. Members
4. File

DESIGN, MANUFACTURE AND TESTING OF PUMPS

L	T	P	C
3	0	0	3

UNIT I: PUMPS AND GENERAL CONSIDERATIONS

Basic equations of energy transfer between fluid and rotor -Classifications of centrifugal pumps, Vector diagram, Work done by impellor, Efficiencies of centrifugal pumps, Specific speed, Model testing, Cavitation and its control, Performance characteristics. Basics of submersible pumps and industrial Pupms –Application of submersible pumps and advantages.

Methods to minimize axial thrust - impellers, casings, volute pumps, vanes - velocity vector diagrams and work done by pumps - developed head, efficiency and losses in pumps, calculation of power requirement, operating characteristics.

(10 hours)

UNIT II DESIGN AND OPTIMIZATION OF PUMPS

Design procedure and design optimization of Pumps. Hydraulic design- Selection of impeller and casing dimensions using industrial manuals. Introduction to computer programs for iterative and interactive design. Application of computational fluid dynamics for design and simulation of pump behavior - governing equations and boundary conditions – turbulence modeling -

(12 hours)

UNIT III CENTRIFUGAL PUMP PARTS MANUFACTURING

Components of pumps – impeller- casing - various methods of molding and casting for pump parts – manufacturing of stampings for pump motor – winding of motors – testing of motors - application of Lean manufacturing in pump industries. (8 hours)

UNIT IV SUBMERSIBLE PUMP PARTS MANUFACTURING

Components of pumps – down hole components – protector – gas separator – pump - material selection - casing - various methods of molding and casting for pump parts – manufacturing of components – machining of parts. - quality control and energy conservation in manufacturing (8 hours)

UNIT V TESTING OF PUMPS

Testing of pumps – norms of BIS for pump testing – construction of test beds – typical performance curves – classification under BIS – Energy Efficiency ratio – star rating of pumps (7 hours)

LECTURE: 45

REFERENCE BOOKS

1. Rajput.R.K., "A text Book of Fluid Mechanics", S.Chand and Company, New Delhi , 2002.
2. Ramamrutham.S and Narayanan.R., "Fluid Hydraulics and Fluid Machines", Dhanpatrai Publishing House (P) Ltd , New Delhi, 2000.
3. Modi.P.N. and Seth.S.M.,Hydraulics and Fluid mechanics, including Hydraulic machines, Standard book house,Delhi, 2002
4. Austin H. Chruch, "Centrifugal pumps and blowers", John wiley and Sons, 1980.
5. Val S.Labanoff and Robert Ross, "Centrifugal Pumps Design and Applications" Jaico P House.
6. IgoriKarassik, "Pump Hand Book," McGraw-Hill International Edition.
7. John Tuzson, "Centrifugal Pump Design," Wiley Publication.
8. Stepanff, A.J., "Blowers and Pumps ", John Wiley and Sons Inc., 1965.

DESIGN, MANUFACTURE AND INSPECTION OF GEARS

L	T	P	C
3	0	0	3

UNIT: I DESIGN OF CYLINDRICAL GEARS

Selection of gear materials, Ferrous and Non-ferrous materials - Design considerations, Beam strength of gear tooth, Dynamic tooth load, Wear strength of gear tooth, Failure modes of gear tooth, Design of spur and helical gears - Standards related to spur and helical gears.

Arrangement of Gears – Gear layout of Multi stage, Planetary, Geared motors - Automotive Gearboxes, Machinery gears, Windmill gearboxes. Gear forces, selection of bearings, lubrication, Design of housings – use of Finite element analysis - Gear design software – Kissoft, Load and Life of gears,

(10 hours)

UNIT: II DESIGN OF BEVEL AND WORM GEARS

Bevel gears: Terminology, Proportions for bevel gears, Minimum number of tooth to avoid interference, Beam strength and wear strength of bevel gears, Design of bevel gears- Automotive applications.

Worm Gears: Types of worms, Terminology, Gear tooth proportions, Efficiency of worm gears, Heat dissipation in worm gearing, strength and wear - tooth load for worm gears, Design of worm gearing – Self- locking property- Design of gear boxes. Replacement of worm systems with Helical Bevels.

(10 hours)

UNIT: III GEAR GENERATION PROCESSES

Gear forming in milling - selection of cutters – gear generation - gear shaping and gear hobbing – specifications - cutters – cutting spur and helical gears - bevel gear generators – straight and spiral - Crowning, tooth pointing, tooth rounding, gear deburring, taper hobbing, CNC programming for gear manufacturing

(8 hours)

UNIT: IV GEAR FORMING AND FINISHING PROCESSES

Gear broaching, gear production by dies - gear stamping, cold drawing, injection moulding, sintering, die-casting of gears, gear rolling, manufacture of worm and worm gear

Gear finishing processes - Grinding - grinders for spiral, bevel, zero bevel and hypoid gears, gear shaving, gear honing, gear lapping - gear burnishing

(7 hours)

UNIT: V ERRORS IN GEARS

Errors in gears– variation in transmission ratio – vibration and noise in gears, control of gear noise-Involute profile measurement – measurement of gear tooth spacing, lead, eccentricity, tooth thickness – gear composite error – testing procedure and testing equipment for spur, helical, bevel, hypoid and worm gears.

Gear heat and lubrication - Load testing and endurance testing of gearboxes. Types of Test Rigs, open loop and closed loop testing, cyclical testing, Housing torque test.

(10 hours)

LECTURE: 45

REFERENCE BOOKS:

1. Joseph E. Shigley , **"Mechanical Engineering Design"**, McGraw Hill Publications, NewDelhi, 5th Edition, 1989.
2. H.Black&D.E.Adams, "**Machine design",** McGraw Hill, New Delhi, 2001.
3. Dr.P.C.Sharma and Aggarwal, **"Machine Design",** S.K. Katara& Sons, 9th edition, New Delhi, 1999.
4. V.B. Bhandari, **"Design of Machine Elements",** Tata McGraw Hill Publishing Company Ltd., New Delhi, 2nd Edition 2007.
5. Robert L Norton, **"Machine Design",** Pearson Education Asia, 2001.
6. D.W. Dudley, **"Dudley's Gear Hand book"**, Dennis P Townsend, McGraw Hill Publications, NewDelhi, 2011.
7. Heinz Heislen, **"Advanced Vehicle Technology",** 2nd Edition, Butterworth Heinemann, New York, 2007

INVESTMENT CASTING

L	T	P	C
3	0	0	3

INTRODUCTION (5)

Overview of investment casting and comparison with other casting processes, Advantages, Disadvantages, Limitations and Applications

DESIGN AND PRODUCT DEVELOPMENT (11)

Product design- Tool design, Feeder design, Gate Design – spruing techniques – wax tree assembly- Cost estimation of product - Estimation of alloy constituents, wax to metal conversion ratios – Selection of equipments for moulding process- simulation software for metal pouring (Precast, Magma)

CASTING PROCESS (11)

Preparation of wax pattern- inversion, wax injection, wax pattern assembly; Shelling – Ceramic coating, Dewaxing; Shell firing – Metal melting, Spectrometer analysis - Pouring; Fettling – Knockout, Cutoff, Grinding, Heat treatment, Shot blasting – Process control

MATERIALS AND INSPECTION (9)

Types of wax, properties, specification and testing for wax materials – Binders and refractory filler materials – testing of binders, slurry and refractory materials – Material standards- ASTM, BIS, JIS, DIN - Destructive and Non-Destructive testing of castings

INDUSTRIAL PRACTICES (9)

Quotation – Follow-up – Costing – Receipt of Purchase order – MRP - PPC – Quality system standards and product certification standards – ISO 9001:2008, Pressure Equipment Directive (Valves) – API(American Petroleum Institute), CE(European Standards), AS(Aerospace)

Total: 45 Hours

REFERENCE BOOKS

1. Investment casting Handbook

Department of Production Engineering (UG)
Government College of Technology
Coimbatore – 641 013.

Date: 28.06.2013

MEETING OF BOARD OF STUDIES

ATTENDANCE

INTERNAL MEMBERS

SL. NO.	NAME OF THE TEACHING STAFF	DESIGNATION	SIGNATURE
1.	V.Sritharan	Associate Professor in Mechanical Engg.	
2.	S.Srinivasamoorthy	Associate Professor	
3.	S.Gopi	Assistant Professor	28/06/13
4.	A.Sasikumar	Assistant Professor	28/6/13
5.	G.Vijaya raja ragavan	Assistant Professor	28/6/13
6.	N.Ajaymanikandan	Assistant Professor	28/6/13
7.	S.Kumar	Assistant Professor	28/6/13
8.	P.Ilamathi	Assistant Professor	28/6/13
9.	M.Sankar kumar	Assistant Professor	ABSENT

Department of Production Engineering (UG)
Government College of Technology
Coimbatore – 641 013.

Date: 28.06.2013

MEETING OF BOARD OF STUDIES

ATTENDANCE

EXPERTS FROM INSTITUTION

SL. NO.	NAME	ADDRESS	SIGNATURE
1	Dr.G.Sundararaj	Associate Professor of Mechanical Engineering, PSG College of Tech., Coimbatore – 641004.	
2	Dr.G.Ganesan	Associate Professor, Department of Mechanical Engineering, Karunya University, Coimbatore.	ABSENT

UNIVERSITY NOMINEE

SL. NO	NAME	ADDRESS	SIGNATURE
1	Dr.Sakthivel	Associate Professor, Department of Mechanical Engineering, Anna University, Coimbatore	

EXPERTS FROM INDUSTRY

SL. NO	NAME	ADDRESS	SIGNATURE
1	Thiru.B.Sundararajan	Execute Director, K6 Alloys Pvt. Ltd, 372/1B, Palladam road, Pappumpatty, Coimbatore-641016.	
2	Thiru.A.Narayanaswami	Vice President – Mfg. Roots Industries, Coimbatore	

Department of Production Engineering (UG)
Government College of Technology
Coimbatore – 641 013.

Date: 28.06.2013

MEETING OF BOARD OF STUDIES

ATTENDANCE

NON-TEACHING STAFF

SL. NO.	NAME	ADDRESS	SIGNATURE
1	Th. G.Murugesapillai	Junior Assistant	
2	Th. R.Manivannan	Mazdoor - II	

STUDENT

SL. NO	NAME	ADDRESS	SIGNATURE
1	Selvan. V.Vivek (Reg. No. 1015155)	Final Year B.E. in Prodn. Engg.	